AMERICAN GAS ASSOCIATION MONTHLY

Vol. VI No. 7

JULY, 1924

A MAN is judged by the company he keeps, and a company is judged by the men it keeps.

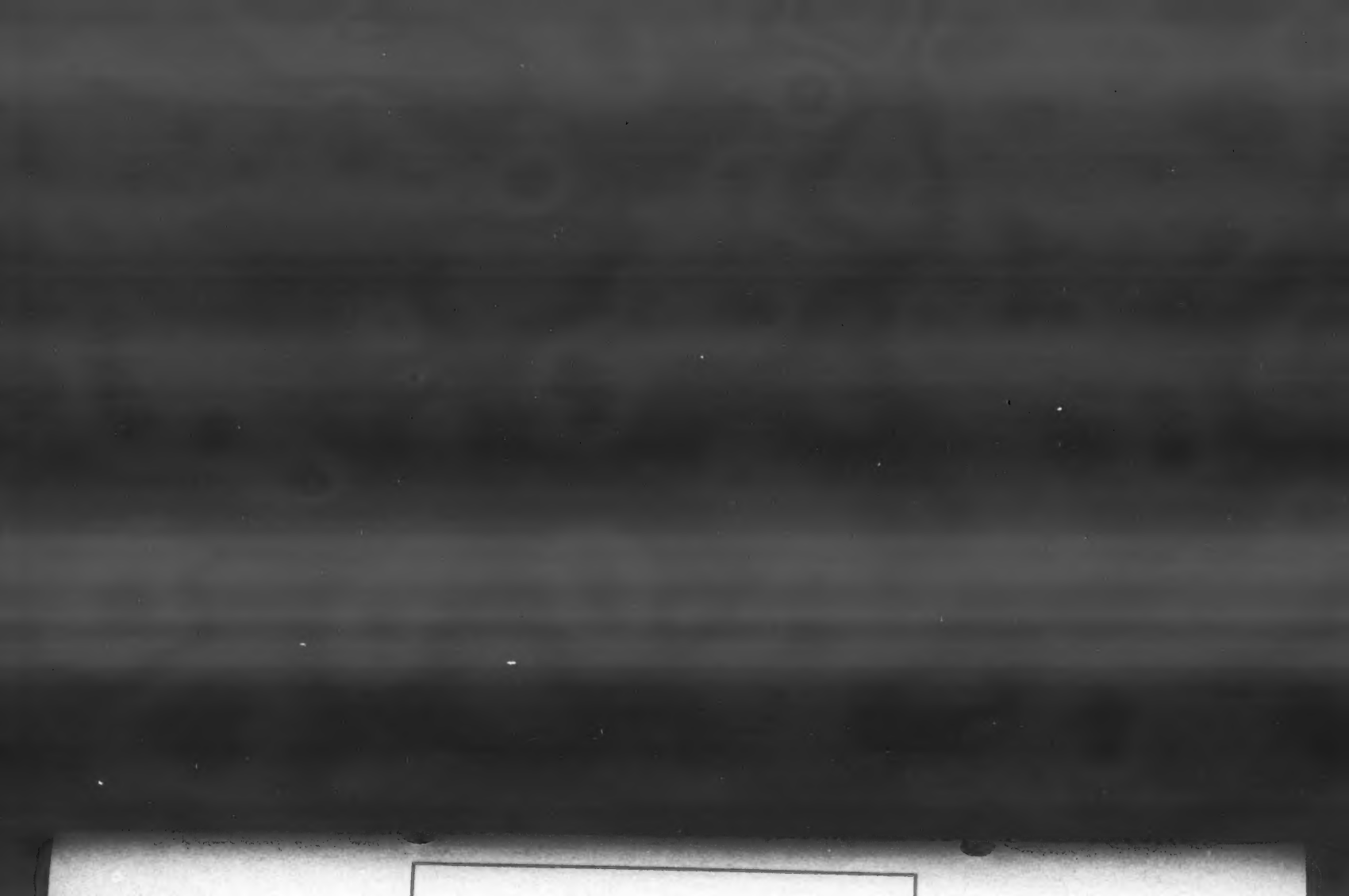
Bound Gas Journals

Headquarters have recently received complete bound sets of the following gas journals:

American Gas Journal—Volume 1 to 75 inclusive (1859-1901)
English Gas Journal—Volume 1 to 144 inclusive (1849-1918)

Complete sets of the above journals are very difficult to obtain and should be extremely valuable to any gas company library which lacks files of these journals. The Association would prefer to dispose of copies of these journals in complete sets as the breaking up of either set would rather depreciate its value.

Company members who may be interested are invited to communicate with Headquarters.



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AUTHORS

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American Gas Association Monthly

Vol. VI JULY, 1924 No. 7

A. G. A. Declares Policy

Stands on Principles Essential for Efficiency in Public Service, Conservation of Fuel and Scientific Rate Making

Adopted in Principle at Spring Conference in Atlantic City, May 23 and by Executive Board on June 18.

The Executive Board and Advisory Council of the American Gas Association, at a conference called to consider the future policy of the industry, were deeply impressed by the necessity of conserving coal and oil, two of the greatest natural resources of the United States, of increasing the efficiency and economy of gas service to present consumers and of broadening the field in which gas service can be profitably applied to new uses.

It was the consensus of opinion that to accomplish the above, the cooperation of the various Public Service Commissions is necessary and that they should be earnestly requested to support the following program:

(1) Abolish the Candle Power Standards where they are still in effect.

(2) Substitute for a uniform state-wide standard such local standards of calorific value per cubic foot as each gas company may find will enable it to give good and economical service to its customers, to economize in the use of oil and to increase the output of gas per ton of coal by supplementing gas produced in existing apparatus with gas produced by apparatus designed to secure the complete gasification of coal, which supplemental supply would probably be an economical and efficient product of not less than 300 B.t.u's per cubic foot.

Such flexibility in calorific standards should necessarily be accompanied by flexibility in rates charged. It is essential that the companies be permitted to adopt rate schedules based on sound and logical analyses, and proper allocation of all expenses, including a fair return. We believe that the adoption of the three-part rate already endorsed by the American Gas Association is essential.

AMERICAN GAS ASSOCIATION MONTHLY

Vol. VI JULY, 1924 No. 7

Rate Structures with a Service Charge*

H. G. WELLS, Member of Public Service Commission of Massachusetts.

AT THE BEGINNING of the gas industry the cost of furnishing gas was borne by all the customers, in accordance with the amount of gas used, at a flat rate per thousand cubic feet of consumption. This was true in both the natural and manufactured gas industries. Subsequently, both found that this method was not a proper one. In New England, as the gas business grew and became more diversified, the men engaged in the industry soon saw that this method was unfair to the companies and unfair to some of the consumers. Certain types of consumers use large quantities of gas regularly, others at very irregular intervals, and still others had meters and equipment to be used only in cases of emergency for lighting purposes when electricity failed. There were summer resorts where large numbers of customers were served three months in the year and close by a community of a small number of customers served by the same company the year around.

Hence various attempts were made to diversify the rate schedules. Various schemes were tried, such as a minimum charge, a demand charge, a smaller rate per thousand cubic feet for large consumption over and above a certain amount of cubic feet. A step-rate scheme was inaugurated by some with a varying rate at various steps in the amount of consumption, and finally a service charge was inaugurated.

Out here your difficulties have not been dissimilar. You have the demand charge which is becoming a more important factor of the changing character of your load factor. It is obvious that only a limited percentage of consumers can afford to use gas entirely for home heating, yet they require increased facilities, such as greater production development and larger distribution line systems, all of which means additional capital investment. This additional burden, in fairness to all consumers, should not be borne by an increase in a flat rate but by those consumers using gas for heating purposes, so it has been suggested that it might be well to take the maximum monthly demand and work out a standby charge based on this factor.

*Paper read before the Convention of the Natural Gas Association of America, Cleveland, Ohio, May, 1924.

You also have in the natural gas industry what is called the Doherty three-part rate, which, as I understand, is made up of a commodity charge, a service charge and a demand charge, the latter being regulated by the consumer himself who upon his own responsibility determines his monthly demand, the company installing a limiting device by which his maximum demand is kept within the predetermined limit. Others, as I understand it, have an upward sliding scale which requires the consumer to pay a higher rate as his maximum demand increases, —just the opposite from some of our schedules in the East. And here, too, you have also come to the proposition of a service charge.

If I am correctly advised, the natural gas industry is finding it necessary, in order to maintain satisfactory service to eliminate a large portion of its heating business because of the depletion of the natural gas fields and the lessened number of units available for distribution on maximum demand days. In other words, the natural gas industry is gradually approaching the point where its gas will be used for the same purposes as we use manufactured gas, that is for cooking and water heating and incidental use in grates and room heaters.

It is also true that you are bothered by the fact that natural gas has a heating value twice that of manufactured gas, and that when natural gas is used for the same purposes as manufactured gas you will be faced with the problem of spreading your distribution charges and other expense over one-half the consumption that would be the case in a delivery of manufactured gas of half the heating value.

Careful Consideration of Costs Necessary

These facts have led every one to the point where more careful consideration must be given to all the costs chargeable to the customer, the proper apportionment of said costs to definite classes of customers, and the corresponding effect upon the rate structure. What are the factors entering into these costs? They may be classified as follows:

Production Expense

This includes all the operating labor, supplies and expense, and maintenance of all investment having to do with the production system and, in addition, the cost of gas purchased from other sources.

Transmission Expense

This includes all labor, supplies and expense in connection with the operation and maintenance of the transmission system structures, lines, compressing and measuring stations.

Distribution Expense

This includes operating labor, supplies and expense, in connection with all the departments having to do with the distribution of gas within the municipality itself.

General and Miscellaneous Expense

This includes administrative salaries, legal expense, insurance, welfare costs, taxes, depreciation, and such other expenses as have not been allocated to the above three classes.

Cost to Supply Various Classes of Consumers

Having determined and classified the costs as above, the next step is to study not so much the average cost per thousand cubic feet, as the cost of supplying various classes of consumers, these classes being determined on the basis of their consumption, and in this way prepare a rate structure which will more equitably distribute these costs to these classes already determined.

For the purpose of studying and discussing this variation of consumption ac-

cording to the different fairly fixed classes of consumption, I have had prepared for me a cross-section of natural gas consumption per consumer per month in five clearly marked classes of consumption in a city of 30,000 inhabitants having 7,000 consumers. This selected city is supplied with natural gas at an average of 50 cents per thousand cubic feet. The analysis of consumers in this city contains the total number and also the quantity of gas consumed by them in each class stated for each month, but I propose to read only the totals for the year. They are as follows:

Of 83,031 accounts 4,997, or 6.02 per cent used one thousand cubic feet or less per month; 10,986, or 13.23 per cent, used between one thousand and two thousand cubic feet per month; 11,688, or 14.8 per cent, used between two and three thousand cubic feet per month; 10,853, or 13.07 per cent, used between three thousand and four thousand cubic feet per month; 9,635, or 11.6 per cent used between four thousand and five thousand cubic feet per month; and so on; 58 per cent of all accounts used five thousand cubic feet or under per month and 86.38 per cent used ten thousand cubic feet or less per month.

CONSUMERS USING 1,000 CUBIC FEET AND UNDER TO 75,000 CUBIC FEET AND OVER

Month	*Accounts*	*1 M*	*2 M*	*3 M*	*4 M*	*5 M*	*6 M*	*7 M*	*8 M*	*9 M*
January	6,857	221	1,018	819	729	590	557	468	376	299
February	6,885	178	917	792	677	604	559	488	428	317
March	6,913	237	970	882	763	638	575	526	354	290
April	6,887	151	748	798	695	675	574	553	422	342
May	6,962	149	542	674	836	833	764	684	567	484
June	6,837	681	1,037	1,253	1,153	959	668	432	230	118
July	6,767	812	1,282	1,331	1,101	857	550	283	187	100
August	6,714	751	1,140	1,266	1,093	903	605	360	208	113
September	6,973	469	869	1,047	1,082	1,066	800	562	353	234
October	7,015	344	678	922	1,054	1,003	825	622	450	318
November	7,105	426	843	950	856	765	702	475	402	286
December	7,116	578	942	954	814	742	643	447	396	250
Total	83,031	4,997	10,986	11,688	10,853	9,635	7,822	5,900	4,373	3,151
Per Cent	100.00	6.02	13.23	14.08	13.07	11.60	9.42	7.11	5.27	3.79

Month	*Accounts*	*10 M*	*15 M*	*20 M*	*25 M*	*30 M*	*40 M*	*50 M*	*75 M*	*Over 75 M*
January	6,857	248	710	319		254	86	69	52	42
February	6,885	237	786	333		295	97	64	61	52
March	6,913	222	718	285		217	92	53	56	35
April	6,887	292	858	338		206	99	47	54	35
May	6,962	326	698	188		107	48	24	22	16
June	6,837	69	120	37		33	13	9	13	12
July	6,767	66	96	32		22	16	6	12	14
August	6,714	66	108	24		29	11	9	14	14
September	6,973	129	215	65		31	13	9	14	15
October	7,015	187	353	117		75	20	12	20	15
November	7,105	255	591	209		171	69	36	42	27
December	7,116	220	518	237		181	82	24	58	30
Total	83,031	2,317	5,771	2,184		1,621	646	362	418	307
Per Cent	100.00	2.79	6.95	2.63		1.95	0.78	0.44	0.50	0.37

M. Cu. Ft.	*Consumers*	*Per Cent*	*Cumulative Per Cent*	*Expense*	*Revenue*	*Profit or Loss*
1	4,997	6.02	6.02	$1.12	$0.90	$0.22*
2	10,986	13.23	19.25	1.51	1.00	.51*
3	11,688	14.08	33.33	1.91	1.50	.41*
4	10,853	13.07	46.40	2.30	2.00	.36*
5	9,635	11.60	58.00	2.69	2.50	.19*
6	7,822	9.42	67.42	3.08	3.00	.08*
7	5,900	7.11	74.53	3.47	3.50	.03
8	4,373	5.27	79.80	3.86	4.00	.14
9	3,151	3.79	83.59	4.25	4.50	.25
10	2,317	2.79	86.38	4.64	5.00	.36
Over 10	11,309	13.62	100.00			

Based on the foregoing analysis and giving consideration to the ninety-cent minimum monthly charge, in effect in this city, I have a table which sets forth the cost of supplying consumers using varying amounts of gas in thousands of cubic feet per mouth. Without attempting to read all of the table, it is to be noted that there is a loss of 22 cents per month per consumer in the class of consumers using one thousand cubic feet or less; there is a loss of 51 cents per month on what we will call the two-thousand-foot class, that is, the class using between one thousand and two thousand cubic feet per month; 41 cents loss on the three-thousand-foot class; 30 cents loss on the four-thousand-foot class; 10 cents loss per month per consumer on the five-thousand foot class; 8 cents loss per month per consumer on the six-thousand-foot class. Those using between six thousand and seven thousand cubic feet are in the first class to show any profit and that profit is but three cents per month per consumer.

SUMMARY SHOWING COMPARATIVE CONSUMPTION ACCORDING TO CLASSES OF CONSUMPTION

	Average Annual Consumption	*Average Monthly Consumption*
Office Consumers	11,000 C. F.	920 C. F.
Merchants	22,200 C. F.	1,850 C. F.
Churches, Schools and Charitable Institutions	33,000 C. F.	2,750 C. F.
Apartments	38,300 C. F.	3,200 C. F.
Residences where gas is used incidentally	42,200 C. F.	3,770 C. F.
Residences of so-called Industrial Centers	95,000 C. F.	7,900 C. F.

The astonishing fact presents itself from these figures that 67.42% of the gas consumers in this city are being supplied at less than the actual cost to the company with the result that the other consumers who are using the larger amount of gas are not only carrying their own burden, but are helping to carry the burden of the smaller consumer as well.

You might be interested to know that a similar study made recently by one of our New England companies, serving about 55,000 customers, indicated that 75 per cent of its customers did not consume enough gas yearly to pay the actual cost to the company. In other words, 25% of its customers consumed enough gas at the uniform rate to enable the company to furnish gas to the remaining 75 per cent at cost, or below, and still make a return on its property.

In this same western city an analysis was made in order to determine the classes of consumers. The results were so surprising that I think you will find it worth while to have this information.

You will note that the class of consumers which does not bear its just burden of the cost of supplying gas does not consist of the average working man (mechanics and the like), but, rather, this class consists of the office consumers, merchants and those, in general, who use gas in an incidental way. The average working man uses his gas for cooking, washing and baking, and for some heating. This is the nature of the average working man's gas consumption because with him and his family it is necessary, as a rule, that the washing and baking and most of the cooking be done at home in order that he may live within his income.

It is strikingly apparent, therefore, that the working man is carrying his own costs and the additional burden of the cost of serving those consumers who use small amounts of gas and do not pay the cost of service.

Limit to Increase in Price

Another phase of this question con-

fronted us in the East during the war-period of mounting costs for labor and materials, and that was the fact that an increase in price beyond a certain point results in a lessening demand, and this is especially true in the smaller towns where gas rates are much higher than in the larger cities and where a lesser amount of gas is sold per dollar of investment. The natural gas industry, also, suffers from this economic law and finds that when gas rates are increased beyond certain definite limits there results a decrease in sales because consumers buy less gas at the higher price. Thus, increasing the rates does not always increase the net earnings of the company, though the public is too prone to believe it does. Very often a point is reached where it is impossible with an average or flat rate to maintain a sufficient net income to enable the utility to receive a fair return upon its property devoted to public service.

These difficulties which we have been discussing can be alleviated by the introduction of a service or a customer charge which will enable each consumer to carry more nearly the burden of his own gas service. The proposition of a service charge in gas rates is by no means a novelty. It is a principle that has long been accepted and applied in rate-making throughout the country.

In our neighboring state of New Hampshire, the question of a minimum monthly price for gas gave rise ten or twelve years ago to a painstaking study of the matter by the commission of that state. Their experience and further study led the commission to introduce and request in rates for gas a service charge, distinguished from a minimum monthly charge, in addition to the rate per thousand cubic feet for gas consumed. When a proper service charge is in effect the average rate for gas would not have to be increased to so large an extent to meet increasing natural gas costs, as would be the case if there were no such service charge. The service charge, therefore, makes possible lower average rates for gas and, by keeping down the average rates in this way, natural gas is placed on a more nearly competitive basis with coal.

The Time to Institute a Service Charge

Of course that argument of a lower rate does not appeal to the small user who would pay more under such a scheme. Objectors to a service charge are naturally those whose monthly bills are thereby increased. Because of this fact, the companies in our territory have learned that the best time to put such a change in the rate schedule into effect is when they would ordinarily be in a position to reduce the existing flat rate. Thus, by the putting into effect of a service charge at such a time the consumption rate can be reduced to a lower figure than would be possible at some other time. In this way, those who would find their monthly bills increased are fewer in number and the opposition is thus lessened.

As I understand the situation in the natural gas industry, there is no immediate prospect of lower rates. The analogy here, however, would seem to point to a putting into effect of such a change at a time when you could have as low a consumption rate as is possible. Yet the question raised by these conditions is of importance, not only to the companies because it affects the proper development of their business, but it eventually also concerns consumers and their individual obligation to pay a reasonable and no more than a reasonable compensation for the service that is rendered each of them without unfair discrimination.

The Small Consumer Answered

As the present practice of a selling price for gas, which is virtually uniform to all consumers, is not just and reasonable to all, then the propriety becomes manifest of introducing a service charge not based upon the amount of gas consumed, but designed to recover those elements of cost which are not proportionate to consumption. Such a price should be in addition to the price per thousand cubic feet consumed, which, in turn, should be designed to recover only the balance of the total cost averaged over the total output. The argument raised by the small consumer is very well answered by the New York Public Service Commission, Second District (re Lockport Light, Heat & Power Co., P. U. R. 1918 C 675):

"It was argued that the small consumer was made to pay more than a fair amount for his electricity, and that there was no justification for such a charge. Because an increase is made in the amount that the small consumer has paid in the past, due to the fact that he has not been paying his fair share of the burden incident to his service is no reason why he should get that service at the expense of the other consumers who use larger quantities of electricity. We have never seen any plausible explanation of the theory that the consumer of small quantities of electricity should be supplied at less than the cost to the company of serving him. As a matter of fact such a claim cannot be successfully defended. It is argued that the service charge raises the rate of the small consumer, who is least able to pay, and lowers that of the large consumer, who is presumably in better financial circumstances, yet we will not presume to, nor does the law require us to, compel a company supplying electricity to furnish it to the small consumer at less than cost and at the expense of those who may be better able to pay; ....."

Logically we are brought to the conclusion that no average price, even with a minimum monthly charge, will place consumers on a fair basis, either with respect to the relations between themselves, because they burn varying amounts of gas, or as affecting their relation with the company. As the Missouri Public Service Commission stated (re City Light & Traction Company, P. U. R. 1918 F 938):

"..... We have approved the Company's suggestion of a service charge in lieu of the more common minimum charge. We believe that it is the more nearly equitable in that it more nearly assigns to each consumer the costs actually incurred by that consumer. If a consumer is living in a house adjacent to a street containing a gas main, he costs the company nothing until he becomes a consumer. As soon, however, as he elects to use gas, the company is put to an additional expense, regardless of whether the consumer uses any gas. ....."

"The minimum charge is more general and perhaps better understood at the present time. It is more discriminatory, since each customer may use gas to the value of 50 cents, and be charged only that amount in the monthly bill, whereas he has not only used 50 cents worth of gas, but he has incurred customer costs, which we might call personal costs, to the amount of another 50 cents. This is unfair to other consumers who must make up the other costs."

Evidence to support these conclusions has been submitted in a number of cases tried before public utility commissions, and the conditions which give rise to it are fully recognized and adopted by them.

The California Commission states that

"We believe that ....the service charge, once established and thoroughly understood will be agreed to as the fairest and most equitable method of fixing rates." (P. U. R. 1919 A 427.)

The New Jersey Public Utility Commission says (P. U. R. 1919 B 884).

"In an application for an increase in gas rates, the company in its petition expressly asked the New Jersey Board not to make a fixed service charge as a part of its schedule of rates. The Board stated that it could not equitably grant this request; that the fixed service charge was a perfectly reasonable means of meeting the higher costs alleged to exist in serving the smaller and more distinct municipalities within the company's territory; that each customer wherever located had devoted to his individual use a service pipe and a meter which benefited no other customer than himself; that this service pipe and meter cost the company a fixed annual amount that should be paid by the individual customer;...."

In fact, substantially forty states now recognize the principles of the service charge. Becoming modesty prevents reference to the first important case determined in Massachusetts under a statute authorizing the imposition of a service charge. In this case the Department spent a great deal of time in going into all the figures with reference to the allocation of costs and wrote a lengthy opinion upon the same.

The Principles of Fair Rates

The problem of just and reasonable rates which are fair to all and not unjusty discriminatory or preferential is not one of abstract theory, but rather one of applied principles. Its solution may not necessarily be the same for every company, or any one company at all times, but there are certain principles which can be observed to the advantage of company and consumer alike, although local conditions may govern the manner of their application.

The factors entering into the cost of service—thanks to the uniform classification of accounts and bookkeeping adopted in practically all states—are well known, and there are no serious complications in arriving at a customer or service charge. With this in mind, I think it is incumbent upon every company to carefully analyze these costs so that they may be submitted to the properly delegated authorities, whether councils or commissions, and submitted in such form that the facts will be readily understood by the consumers themselves.

Generally speaking, the cost subdivisions which are attributable to each consumer directly are as follows:

Meter Department

Labor of removing, setting, inspecting, testing and reading meters.
Meter department supplies.
Maintenance of meters.
Depreciation on meter investment.
Return on service investment.

Service Department

Maintenance of service equipment on consumer's premises.
Depreciation on gas service investment.
Return on service investment.

Commercial Department

Salaries of bookkeepers and clerks keeping accounts and making out and mailing bills.
Heat, light, supplies, postage and rent.
Supplies and such portion of general office expense attributable directly to investment on consumer's property and the consumer's proportion of the general administrative expense on the basis of the ratio that the consumer's direct expense bears to the total expense.

I agree with the clear statement of the matter made by Carl D. Jackson and

recently published in your official magazine, "Natural Gas":

"The whole theory and principle of a service charge is, therefore, to take care of certain customer expenses, which are the same for every customer, which must be met somehow, and which, if not met by a service charge, must be added to the rates for gas by a considerable increase to them. That this would be inequitable, as among consumers who burn different amounts of gas, is quite clear, because the increase per thousand feet would affect their bills by different amounts, according to the amount of gas which each burns. Some consumers, therefore, would be paying each month more than their share of customer service expenses, and others less, although the amount that each really owed would be the same."

Conclusions

In concluding, let me say that I appreciate that you men in the natural gas industry have a double problem on your hands: you must conform yourselves to the constatly changing conditions of business generally, as we all must do, and you must adjust your business to a gradually changing nature of the commodity in which you deal.

This last sets in motion a whole series of new calculations, in order that the rates to be charged may bear correctly on the costs involved and the entire construction of rates be equitable as between consumers, while, at the same time, yielding revenues adequate for the efficient maintenance and development of the utility and a fair return upon the investment. I have touched upon the service charge principle as one of the things which can be made to serve both public and utility.

But if the basis of rate-making is equity as among consumers, and adequacy to the utility, the background of correct rate construction is popular understanding. I believe in the public and I am just optimist enough to believe that the public's confidence and understanding (they are pretty much the same thing) are possible, with candor and effort on your part. First, understand and chart your costs so that they are easily accessible and presentable, then make them easily understandable and bid for your customers' cooperation on a basis of fairness and justice to the company and to the consumer, and I believe you will get it. I believe, in a word, that the public can be led to appreciate that a public utility has no problem that its customers do not share equally with it.

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Another Baltimore Innovation

The year book of the Baltimore company is now in its third edition. The first was sent to all stockholders, employees, and a mailing list for publications, etc. The second edition was sent to all of the known bondholders of the company. The third, in reduced size, was recently mailed to 200,000 customers. With the latter was enclosed a card inviting inquiries in reference to the company's customer ownership plan.

Louis H. Buckley

Louis H. Buckley.

IT IS WITH DEEP REGRET that we announce the sudden death of Mr. Louis H. Buckley, President of the Worcester Gas Light Company, Worcester, Mass., on May 26.

Mr. Buckley was born in Worcester, October 12, 1865. He attended the public schools of the city graduating from the Classical High School to take up a business course at Becker's Business College. Shortly after he became an employee of the Logan, Swift & Brigham Envelope Company where his advancement was rapid, becoming general manager at the time this firm was merged with the United States Envelope Co. of which he was vice-president and assistant general manager at the time of his death.

In 1918, Mr. Buckley was elected a director of the Worcester Gas Light Company and in the following year, president. From the very first he was an indefatigable worker for both improved service to the consumers and a better and more substantial financial foundation for the company. And it was largely due to his efforts that both of these objects were successfully accomplished.

Mr. Buckley was most active in other business affairs in his city as well as an incessant worker in a great number of civic and national movements. His loss will be distinctly felt not only by the Worcester company but by the entire city of Worcester.

Rene T. Hugo

Mr. Rene T. Hugo, the President and General Manager of the Hugo Manufacturing Company of West Duluth, Minn., died Sunday, June 8, at his home in Duluth.

It is with deep regret that we make this announcement for Mr. Hugo was prominent not only in the manufacturing field directly allied with our great industry but also in civic and national activities. He was born in Owen Sound, Canada, in 1882, coming to Duluth when only three months old. He received his education in the public schools of Duluth and the University of Minnesota.

His death will be a distinct loss to the industry to which he was so closely allied.

Donald McDonald

Donald McDonald

IT IS WITH SORROW that we announce the death on June 3 of Donald McDonald, vice president and general manager of the Louisville Gas & Electric Company, Louisville, Ky.

Mr. McDonald, who has long been prominent in the gas industry, was born in Winchester, Va., September 5, 1858, and was a graduate of Washington and Lee University. He became practically at once identified with the public utilities, first with the Louisville & Nashville Railroad, then with the Kentucky Rock Gas Company, the Kentucky Heating Company and finally in his present position with the Louisville Gas and Electric Company.

Mr. McDonald was always active in civic affairs besides his many affiliations within the industry among which might be mentioned his activities as president of the American Gas Institute in 1910. Nothing further can be said than the following editorial quotation from the Louisville Herald:

"It is a very real loss.

"Here was a man who had made no concessions to popularity, who did not care to flatter or condescend to the mood of the hour. He was content to let his acts, his policies or his words stand for what they were. And yet, in his death, he is widely mourned, broadly regretted and the sense of a public loss is everywhere. To all has come the realization voiced by the officers and employees of the great corporation with which he had been so long and so honorably identified, the sad assurance that an active and a useful life, a life shot through with a high sense of civic duty, had been brought tragically to a close."

In Memoriam

Charles S. Smith, Assistant Manager, The American Gas Company, Philadelphia, Pa.

Roger S. McCoy, The Consolidated Gas Co. of New York, New York, N. Y.

GENERAL

CHAIRMEN OF GENERAL COMMITTEES ORGANIZED TO DATE

Accident Prevention—F. W. Fisher, Rochester, N. Y.
Amendments to Constitution—Wm. J. Clark, Mt. Vernon, N. Y.
American Engineering Standards Committee, Representative on—A. H. Hall, Cambridge, Mass. —(Alternate Representative) W. J. Serrill, Philadelphia, Pa.
Award of Beal Medal—J. B. Klumpp, Philadelphia, Pa.
Chamber of Commerce—R. B. Brown, Milwaukee, Wis.
Cooperation with Educational Institutions—W. G. Gribbel, Philadelphia, Pa.
Customer Ownership—Chas. A. Munroe, Chicago, Ill.
Education of Gas Company Employees—B. J. Mullaney, Chicago, Ill.
Entertainment—Wm. J. Clark, Yonkers, N. Y.
Finance—James Lawrence, New York, N. Y.
Gas Code—W. R. Addicks, New York, N. Y.
Gas Standards and Service—R. B. Harper, Chicago, Ill.
National Fire Protection Association—R. S. Doull, New York, N. Y.
Nominating—H. A. Norton, Boston, Mass.
Rate Fundamentals—H. M. Brundage, New York, N. Y.
Representation on National Joint Committee of Public Utility Associations—D. D. Barnum, Boston, Mass.; R. B. Brown, Milwaukee, Wis.; H. L. Doherty, New York, N. Y.; A. Forward, New York, N. Y.; C. H. Gribv, Philadelphia, Pa.; J. B. Klumpp, Philadelphia, Pa.; A. P. Lathrop, New York, N. Y.; Chas. A. Munroe, Chicago, Ill.; Wm. L. Ransom, New York, N. Y.
Standard Gas Appliance Specifications—W. T. Rasch, New York, N. Y.
United States National Committee of International Commission on Illumination, Representatives on—Howard Lyon, Gloucester, N. J.; E. H. Earnshaw, Newark, N. J.; G. G. Ramsdell, New York, N. Y.

Insurance Companies Combat Government Ownership

REPRODUCED BELOW is the full text of a pamphlet received from the Casualty Information Clearing House, Chicago. Regarding its distribution, Henry S. Ives, secretary, writes:

"We are sending this out to the 25,000 agents of stock casualty insurance companies who subscribe to this bureau, accompanied by a letter asking them to see that the 'Message' reaches their policyholders and patrons. We are ready to supply to them free all the copies which are reasonably necessary. The response to this request has been astonishingly large and we have been fairly swamped with orders, all of which indicates a very general interest in the subject matter of this little bulletin.

"As you perhaps know, there is no direct contact between the casualty and fire insurance companies and the buyers of insurance. For that reason the only way in which we can reach policyholders is through the agents. This necessitates in the first instance arousing the interest of these agents.

"Although the gas industry is not mentioned specifically in this bulletin, it does, of course, come under the general heading of public utilities."

A Message to Policyholders

Every insurance policyholder is a property owner, for every insurance policy is property, or represents property.

It is a natural human impulse for the owner of property to protect that which he owns. The institution of insurance is founded on that impulse. Protection is the background of insurance.

The property owner, however, often fails to heed the impulse to protect his own when it comes to his insurance policy. This is perhaps because he usually does not realize that his policy is a very tangible kind of property in itself.

In America there are more than 65,000,000 policyholders, not counting those having an indirect interest. They rule the republic. They elect legislators and executives. They are the foundation of all political power. But despite all of this they often approve of economic and political policies directly aimed at undermining the property rights which insurance not only represents but protects.

The present wide-spread agitation, largely manufactured by demagogues, for the political ownership and operation of steam railroads, electric light and power plants and other so-called public utilities is a case in point.

It is the money of the people largely invested through insurance companies and savings banks which has developed these great and very necessary public service organizations. Each insurance policyholder has a vested interest in them whether he knows it or not. This interest is part of the value of an insurance policy as property. And it ought to be quite apparent that the policyholder has a very vital concern in protecting such interests.

Sound insurance companies must maintain at all times funds in reserve to meet future losses. The money so held must, of course, be made to earn its "keep." The electric light and power companies, the steam railroads and other like enterprises have offered exceptionally safe and conservative opportunities for such investments. In buying the bonds and other securities of these very necessary organizations the insurance companies aid in their development as well as safeguard their own resources, and thus supply a real public service.

As a matter of fact the insurance investments in industry represent a collective ownership of industry by insurance policyholders who either have an actual title or claim to the invested reserves, or have a very substantial equity in them. And it is these industries which must be saved from socialization if the insurance policyholder desires to protect his investments in insurance. He has the power to do so, if he has the will and the vision.

The foundation of our national prosperity rests upon private enterprise. It ought to be quite clear that if such great institutions as the electric light and power industry, the business of transportation and the other similar public service institutions be confiscated by the government, forced out of business by government competition, or subjected to repressive and unreasonable regulation by the government, that every property owner, and particularly the owner of insurance policies, will suffer materially. The result is as inevitable as is death and taxes.

Insurance itself is threatened directly with the public ownership menace. The stock casualty companies are furnishing the "shock troops" to combat this agitation, and many policyholders already have awakened to the danger to their own property rights and to the privilege of freedom of contract which they now enjoy because of the invasion of state governments into the insurance business.

Every insurance policyholder should stop and think of the result of having the institution of insurance operated by a political bureaucracy. The vast investments—more than $11,000,000,000—of insurance in the primary industries of the nation would be a sweet morsel for spoilsmen. And what indeed would become of individuals and privately conducted business enterprises now relying in part on insurance investments for their industrial needs?

These are things which every owner of an insurance policy ought to think about seriously, and while thinking to remember that he, as a policy owner, is

likewise financially interested in the prosperity of every industry, from railroads and electric light plants to the farm and factory, in which insurance funds are invested. This country cannot exist half socialist and half free any more than it could have existed "half slave and half free," and no class of people is more vitally concerned with maintaining the integrity of private enterprise than is the class composed of insurance policy owners

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Providence Honors "Old Timers"

The Providence Gas Company honored its old employees at a theatre party at which each was presented with a service button.

Those so honored with the year in which their service began, as shown in the picture, were—

(First Row)

Thomas Maloney—1880
Selah B. Brown—1874
Thomas Dunn—1889

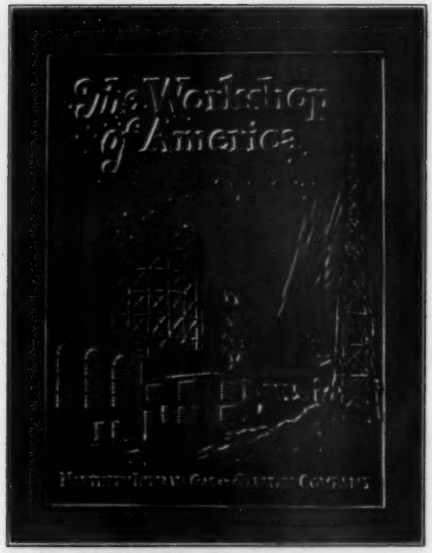
(Second Row)

Julius Waugh—1890
Michael Gibbons—1884
Patrick Dooley—1877
James Radican—1856
Philo W. Sutton—1873
Miles McNiff—1872
Henry J. Bemis—1878
Herbert E. Baker—1888
Ellery I. Wilcox—1894
David Larkham—1890
Chas. D. Holdridge—1892
Eugene Waugh—1892

(Third Row)

Herbert A. Bemis—1889
William Duggan—1886
Patrick Duffy—1881
Wm. F. Briggs—1891
Andrew Newberg—1887
Zephaniah G. Pierce—1885
Mr. Manchester—President
Mr. Freeman—Vice-President
Walter Mathews—1889
Thos. R. Simmons—1885
Wm. J. Bowditch—1894
Chas. H. Niven—1886
Howard W. Randall—1888

The Workshop of America



The Cover.

THIS IS THE TITLE of a very attractive booklet recently issued by the Northern Indiana Gas and Electric Company. Its purpose is to point out the "Efficient Public Service" furnished by this company, especially in reference to the industrial field. To quote from the foreword:

"Immediately bordering Lake Michigan's southern end and stretching southward into Indiana, lies a territory of unequalled industrial significance. Even with the tremendous manufacturing enterprises already located within the bounds of this area, there is a constant influx of new business interests. Probably nowhere else in the United States is industrial development going forward so rapidly. The public service properties of the Northern Indiana Gas and Electric Company, furnishing light, heat and power to thirty-six communities located here, is fast becoming the integral force in concentrating and intensifying the industrial activities of the territory. Something of the present significance of this section from the industrial point of view, its indications for future greatness, and a bit about the part being played by the Northern Indiana Gas and Electric Company in establishing it as one of the prominent industrial centers of America are to be found on the pages that follow, together with pictures of some of the company's properties and industries which it serves."

Some of the figures of growth are interesting. The gas sales increased from 2,086,392,789 cubic feet in 1917 to 3,357,220,700 cubic feet in 1923. The gas consumers in 1917 were 73,004 and in 1923 they were 91,861. And, as the whole book emphasizes, this has been principally *industrial* growth.

The book contains many interesting illustrations and is an excellent piece of good-will literature as well as a strong "industrial business getter."

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The New Rate List

Rate List No. 2, containing all changes in gas rates up to and including January 1, 1924, is now being mailed to members.

The American Gas Association's Meritorious Service Medal

The Obverse

THE ASSOCIATION wishes to announce the establishment of "The American Gas Association's Meritorious Service Medal." This medal, the generous gift of Mr. Walter R. Addicks, Vice-President of the Consolidated Gas Company of New York, is to be awarded for meritorious service in the promotion of safe service in the gas industry.

The medal itself, as shown in the illustrations, carries on the obverse the inscription indicating the significance of the award incorporated in the design. The reverse is to be inscribed with the recipient's name and the date of the occurrence that prompted the award. With the medal will also go a button indicating that the wearer is a recipient of the Meritorious Service Medal.

The award is to be under the supervision of the Accident Prevention Committee of the Association and will be made according to the following general qualifications:

Not more than one medal to be awarded annually for a period covered by the prior calendar year,—provided a meritorious act was performed.

Award by and with the authority of the Executive Board as now constituted or any successor governing body of the American Gas Association, or its successor.

Only to one who has shown meritorious and conspicuous judgment, intelligence or bravery in saving human life either in the plant or works of any gas undertaking or having to do with the handling of the materials of manufacture or of the products manufactured or distributed.

Any loyal citizen of the United States, without regard to age, sex, race, religion or political affiliation shall be eligible for an award, provided, however, he was at the time of the occurrence regularly in the employ of, or an officer of, a member

The Reverse.

The Button—9/16" Square.

company, or was at the time an active or an associate member of the American Gas Association or of its successor.

An award may be made, if the Executive Board so order, in memory of one who, if surviving, would have received such award provided there be a widow, son, or daughter surviving, to receive custody of such award.

Accompanying the medal will be a statement setting forth the salient facts that justified an award, a copy of the resolution of the Board that authorized the award, signed by the President of the Association and attested by its Secretary-Manager.

All applications must be received at Association headquarters, 342 Madison Ave., New York City, on or before August 15, 1924 for consideration in the award of 1923 medal.

The Rest Lounge at the Gas Exhibit, Wembley, England.

Gas Institute Formed in New Zealand

WE ARE INFORMED, in a recent issue of the *Gas World*, that the American Gas Association now has a counterpart in the antipodes where the Gas institute of New Zealand has been formed with forty member companies, representing a combined annual output of 3,500,000,000 cubic feet.

"The objects of the institute," to quote the charter, "are to promote the advancement of the gas, coke and other coal products industries in all or any of their branches, particularly to enable persons who are, or have been, engaged in the conduct of any undertaking in these industries to meet and to correspond; to facilitate the interchange of ideas respecting improved methods of adminstration in such undertakings, improvements in the manufacture and distribution of gas, improvements in the application of gas lighting, heating, production of power and other purposes, and improvements in the construction of gasworks and gas appliances; to conduct or promote investigations into all or any of the matters connected therewith; and generally to aid, promote, and encourage the acquisition and diffusion of knowledge concerning the production, application and distribution of gas, the conduct of gas, coke, and other coal products undertakings, and all related matters."

The inaugural meeting was held at the offices of the Wellington Gas Company on February 26, with James Lowe, of Auckland, in the president's chair, and H. Rands, of Wellington, as the secretary. The first work of the institute will be to secure certain amendments in the proposed regulations affecting the gas industry which the Board of Trade have under consideration. The meeting appointed a committee to interview the Minister and the Board.

Use of Gas in Industry

In the country at large, probably more manufacturers turned to gas for their heating processes during 1923 than in all time previous. There has been only one parallel to this movement in industrial history of the United States—the turning of manufacturers, during very recent years, to electrical energy for power.

In 1910 only 5 per cent of the nation's total gas production was used for industrial heating purposes in factories and shops. The ratio is now 25 per cent (the Chicago ratio is higher) and is one of the reasons why actual consumption of gas in the United States has increased 100 per cent in ten years, in the face of decreasing use of gas for lighting. Year Book, Peoples Gas Light & Coke Company, Chicago, Ill.

The Seven Ages of Woman

From the Gas Exhibit, Wembley, England

1—Infancy
2—Childhood
3—School Days
4—Student Days
5—Business Life
6—Married Life
7—The Autumn of Life

Utilization Exhibits at Wembley, England

1—Pottery Firing
2—Sweet Making
3—Cookery
4—Industrial
5—Geyser Exhibit
6—Water Heating

1924 Convention Notes

Railroad Fares

The Association is glad to be able to announce that the reduced railroad fare schedule, fare and a half, will again be in effect for the coming Convention at Atlantic City in October. In making these arrangements this year, however, the Association had to guarantee that these reduced fare certificates would only be issued to bona-fide members of the Association. These certificates will be issued to our membership on or about September 15.

Program

The program for the General Sessions is rapidly being whipped into shape and promises to carry features that will be of great interest to our members. The Sectional programs are also well advanced and will contain addresses and reports that no gas man can afford to miss. Announcement in a more definite form will be made to our membership at as early a date as possible.

Exhibition

With the Steel Pier completely roofed and closed in this year from boardwalk to concert hall, the exhibition of appliances, apparatus and accessories will be larger and more attractive than ever this year. This is well founded on the returns to date. Since the prospectus was mailed, May 10th, headquarters have received applications for exhibition space from 135 manufacturer company members who have already filled 90 per cent of the space available. The names of exhibitors, up to June 11, will be found listed in this issue under the Manufacturers Section.

Entertainment

The Entertainment Committee, while not ready to make any definite announcement as yet, is working on some features especially attractive for this year's entertainment program. Some of the old and best liked events will be retained and additional attractions arranged for, which will greatly add to the enjoyment of those attending the coming Convention.

ACCOUNTING SECTION

W. A. SAUER, Chairman — H. C. DAVIDSON, Vice-Chairman

H. W. HARTMAN, Secretary

MANAGING COMMITTEE—1924

ARMSTRONG, J. J., Toronto, Can. (Canadian)
BARTON, W. H., Portland, Ore.
BISSELL, J. H., Boston, Mass.
BLANCHFIELD, J. J., Brooklyn, N. Y.
CARROLL, H. P., Beaumont, Texas. (Southwestern)
CLINTON, DEWITT, Worcester, Mass. (N. E. Gas Eng.)
DOERING, W. A., Boston, Mass.
FREY, H. F., Allentown, Pa.
HAASE, EWALD, Milwaukee, Wis. (Wisconsin)
HALL, I. S., Boston, Mass.
HEINS, J. W., Philadelphia, Pa.
HOFFMAN, F. C., St. Paul, Minn.
JAMES, F. M., Aurora, Ill. (Illinois)
JAMES, W. H., Petersburg, Va. (Southern)
KELLER, A. R., Syracuse, N. Y.
KURTZ, ADAM, Detroit, Mich. (Michigan)
LAWALL, H. J., Philadelphia, Pa.
LAWRENCE, JAMES, New York, N. Y.
MEYERS, W. J., New York, N. Y.
MURFIT, W. G., Newton, Pa.
PAGE, HOMER, Charleston, S. C.
PATTERSON, F. H., Rochester, N. Y.
PETTES, W. H., Newark, N. J. (New Jersey)
PLATT, O. W., Portland, Ore. (Pacific Coast)
PORTER, EDWARD, Philadelphia, Pa. (Pennsylvania)
POTTER, C. F., Newark, N. J.
REESE, J. G., Baltimore, Md.
REYNOLDS, A. E., Springfield, Mo. (Missouri)
SCHMIDT, WM., Jr., Baltimore, Md.
SCOBELL, E. C., Rochester, N. Y. (Empire State G. & E.)
SCOTT, J. M., Wilmington, Del.
SEARING, R. B., Sioux City, Ia. (Iowa)
SEARLE, A. A., New York, N. Y.
SHORT, A. F., Providence, R. I.
TOSSELL, A. L., Chicago, Ill.
TRACY, F. B., Muncie, Ind. (Indiana)
WILBUR, A. A., Brockton, Mass. (Gas Sales of N. E.)
WINTERS, A. C., Chicago, Ill.

CHAIRMEN OF SECTIONAL COMMITTEES ORGANIZED TO DATE

Analysis of Gas Company Statistics—H. J. LAWALL, Philadelphia, Pa.
Budget—F. H. PATTERSON, Rochester, N. Y.
Customers Accounting—H. J. FREY, Allentown, Pa.
Insurance—J. G. REESE, Baltimore, Md.
Nominating—J. W. HEINS, Philadelphia, Pa.
Relations With Customers—DEWITT CLINTON, Worcester, Mass.
Improving Relations Through Employees Visiting Customers' Premises—W. H. BARTON, Portland, Ore.
Errors, Their Correction and Prevention—J. M. ROBERTS, Chicago, Ill.
Security Holders' Records—E. MACMORRIS, Philadelphia, Pa.
Welfare Systems—O. F. POTTER, Newark, N. J.
State Representatives and Contributions to Monthly—A. L. TOSSELL, Chicago, Ill.
Uniform Classification of Accounts and Form of Annual Report to Public Service Commissions—W. J. MEYERS, New York, N. Y.

Consumers' Gas Company of Toronto Meter Contracts

C. E. SCOTT, Consumers Gas Company, Toronto, Can.

METER CONTRACTS are printed on a light weight card, 4" x 6" in size. On the contract side space is provided for the new address, name of consumer, previous address, where employed, date, order number, phone number, call date, the contract rules and the customer's signature. This card is shown in Fig. 1.

The reverse side is used jointly by the Addressograph and Collection Departments. The name and address of the customer is printed by the Addressograph at the top of the form. The final account and arrears of gas and merchandise are entered below the name and address. The collection detail is filled in when the contract is terminated.

An application for a meter is received either by telephone or at the order desk. The telephone order (called a "get signature") differs from a regular signed contract by the special instructions for workman to have the customer sign a contract when the gas is turned on.

Work tickets, as shown in Fig. 2, are written in quadruplicate and attached to the contracts. The machine used is a 12A Remington-Egrie typewriter, quiet model, No. 62 Gothic type. The worktickets are printed in rolls and placed on spools in a rack above the typewriter. The worktickets pass over a specially constructed platen having a triplicate ribbon device. A heavy printed line indicates

APPLICATION FOR GAS, METER, ETC. ORDER NO. 62930

ADDRESS APT.	NO.		FL.	TAKEN BY	TIME	DATE MOVED IN	UNLOCK	SET
	836	KING ST. W		MAS	9 45	Oct. 6	✓	

NAME	PREV. ADDRESS	DATE TO BE C.O.
MR. H. R. ROBINSON	125 Huron St.	Oct. 6/21

TENANT	OWNER	DWELLING OR WHAT BUSINESS	SEC'Y ASKED YES	SEC'Y ASKED NO	C.O. KEY AT	PHONE	CENSUS
✓		✓			127 Huron St.	Rd. 4701	

EMPLOYED BY	PREV. CONS.	DIS.	LED.	ZONE
Trusts & Guarantee Co Ltd	R McDonald	17	8	T27

WHERE	AS	NEW ON KEY AT	CALL
302 Bay St.		Open	Oct. 6/21

CONTRACT *The subscriber hereby makes application to have gas supplied at the address above mentioned, and agrees to pay for all gas supplied at such price or prices and on such terms as may from time to time be fixed by the Company, including service charges and agrees, if requested, to give security for payment, and further agrees to comply with and be bound by the terms and conditions hereinafter set forth as well as by such other and further terms, conditions, rules or regulations as may from time to time be established by the Company.*

The gas is to be drawn through a meter or meters supplied by the Company. The quantity of gas supplied (save as herein after provided) is to be determined by the registration shown on such meter or meters. If, for any period, a meter fails to register the quantity of gas supplied, then the quantity supplied during the period is to be estimated on the basis of the average daily registration of another meter set in its place or on the quantity of gas supplied in a corresponding period. The subscriber shall pay for all gas supplied hereunder from the date of this application until a reasonable time after written notice to discontinue the supply of gas shall have been received at the Head Office of the Company and a reasonable opportunity given to the Company to enter the premises for the purpose of discontinuing the supply. Meters will be read as nearly as may be once in each month and all accounts shall be paid promptly upon being rendered. The Company shall be at liberty to cut off the supply of gas, or lock or remove any meter whenever default is made in payment for gas supplied, cost of service, lamp service charges, for merchandise supplied, or for the cost or any part of the cost of installing any pipe or pipes for the supply of gas to or within the said premises, or whenever default is made in payment of any indebtedness of the subscriber to the Company whether incurred under this application or otherwise, or whenever default is made in giving security, when requested. The agents or servants of the Company shall be permitted to enter the premises at all reasonable hours (whether before or after discontinuance of service) to inspect and examine the meters and pipes and to lock, remove or exchange, any meter. The subscriber shall protect all meters and pipes from frost. Meters will not be attached until pipes are found to be gas-tight and should pipes be found not to be gas-tight a charge of fifty cents may be made for each inspection after the first inspection.

TO THE CONSUMERS' GAS COMPANY OF TORONTO

SIGN HERE (NAME IN FULL) H R. Robinson

Oct. 6/21 DATE

MAS WITNESS

Fig. 1

THE CONSUMERS' GAS COMPANY OF TORONTO ORDER NO. 62306

1209-10M-12-23

METER UNLOCK OR SET ORDER

NOTE—Fitter must not make any notations on this pink or order until work is completed. Fitter must see that meter, unlocked or set, supplies the consumer named on this order.

Address	836 KING ST. WEST	Fl. 2	Date Written by	OCT-5-21 HC	Phone No. AD-4701
Name	MR. H. R. ROBINSON		Kind of Business	FLAT	Dist. 17 Led. 8
Prev. Address	125 HURON ST.		Prev. Cons.	R. McDonald	Zone T 27
Call	OCT-6-21		Key at	OPEN	

Clearing File Record			Size	Coy's No.	Maker's No.	Index
Floor	2nd	NOS.				
Apt. No.		UNLOCK	5	437	112423	678
St. No.	836	SET				

FITTER'S REPORT—How Found Lkd How Left On Lock No. 4798

Give correction of Name if necessary OK What is correct Street Number 836 No. of Floors 2

If more than one riser State floor or Apt. Supplied. Apt. No. Fl. 2 Time Called 10 45 Date Completed 6-10-21

SPECIAL REPORT. FITTER. G Robbie

Cleared by Shop	Despatch Record	Comps.	Meter Record	Addressograph	Ledger Keeper
OCT 6	OCT 6 PM	DB.	JH	LB	L.

Fig. 2

where tickets are drawn over the knife bar to cut to a uniform size. When work-tickets have been written and attached to contract they are ready for clearing.

The clearing file, Fig. 3, contains a record of services and meters previously installed. The cards, 3" x 5" in size, are arranged alphabetically by street name, and numerically by street number. The record of the meter order is made on the card by use of a rubber stamp. With an unlock order the meter number, district and ledger folio is copied from the card to the workticket after registration has been made. Set meter orders are registered if service is shown to be complete at the address named on the order. The registration on the card prevents duplication of orders.

Cleared orders are passed to the despatcher for a serial number. The number is stamped on each ticket by an electric numbering machine. After the orders have been listed on the despatch book they are separated and forwarded to the shop department for execution. As a check against the loss of tickets during transit a copy of the despatch record is forwarded with the worktickets. The original despatch sheet has a column reserved for stamping off worktickets when returned completed. Each month a tracer sheet is made up of the outstanding orders as shown on the despatch record.

Numbered orders are separated and despatched as follows:

1. Contract—to pending file.
2. Workman's order—to shop office.
3. Shop office copy—to shop office.
4. Commercial Department copy—used as a prospect by Sales Department.
5. Credit Department copy—used by credit clerk in advance of contract.

Why nots, on uncompleted meter orders, are received daily and attached to the contract in the pending file.

When meter worktickets are completed they are listed in the shop office on an

Fig. 3
APPLICATION DEPARTMENT
Clearing Files—in front of windows. Meter Record Cabinets—in center.

Fig. 4

ADDRESSOGRAPH DEPARTMENT
Printing machines and filing cabinets

Fig. 5

ADDRESSOGRAPH DEPARTMENT
Listing and billing machines

Fig. 6

ADDRESSOGRAPH DEPARTMENT
Graphotype machine for stamping plates

Internal Despatch sheet and returned to the Application Department by a midnight delivery. The orders are then stamped off according to a serial number in the column provided on the despatch record book.

Worktickets are now matched up with contract removed from pending file and reviewed by the censor and corrections and errors noted. Incorrect orders are returned to the shop office on a special tracer for a report. Worktickets are then posted on the Meter Record (see Fig. 3) and finally checked with the Internal Despatch sheet before forwarding to the Addressograph Department.

With a Set Meter order the Addressograph Department, Figs. 4, 5 and 6, print the ledger card, meter reading slip and a card for the clearing file. With an unlock order only the clearing file card is printed. The contract is now separated

Fig. 7
BOOKKEEPING DEPARTMENT
Ledger desks

Fig. 8
COLLECTION DEPARTMENT
Consumer's File

from the workticket and forwarded to the Credit and Collection Department. The workticket, together with the ledger card and meter reading slip is forwarded to the Bookkeeping Department shown in Fig. 7.

After the usual entries have been made by the Ledgerkeeper, the workticket is initialed in the frame provided on the bottom of the ticket and returned for filing in the Application Department.

The consumers' file, Fig. 8, in the Credit and Collection Department contains all the active contracts filed according to name only. The Addressograph printing on the contract is an aid to correct filing. As meters are discontinued the corresponding contract is removed from the file and the details of the final account and arrears entered in the space provided. Finally when all outstanding accounts have been paid the cancelled contracts are stamped "paid" and returned to the Application Department for filing.

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Some Change!

Half a century ago San Francisco was paying $6.00 a thousand cubic feet for gas. Even that would have been a cheap price in Sacramento, for there, householders were paying $9.00.

Such prices were not peculiar to life on the west coast. The cities of the south, with more capital for industry and comparatively long experience, fared little better. Galveston and Montgomery, in fact, had a rate of $8.00, ranking second to Sacramento. Charleston's rate was $7.00, Savannah, Vicksburg and Norfolk paid $6.00, the same price as San Francisco. Then came Atlanta and Memphis with $5.50, Mobile with $5.00, Nashville with $4.50 and New Orleans with $4.00.

The reason, of course, was that it took more money to make gas in those days. Methods of manufacture were crude. American inventive genius was not awake. When it did take up the problems involved in gas manufacture costs were reduced at frequent intervals and the price dropped steadily to a figure that brought about a wider and more general use of the product.

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PUBLICITY AND ADVERTISING SECTION

J. M. BENNETT, Chairman — F. L. BLANCHARD, Vice-Chairman

CHARLES W. PERSON, Secretary

MANAGING COMMITTEE—1924

BORDEN, A. W., Hastings, Neb.
BURNS, J. J., St. Louis, Mo. (Missouri)
CLIFFORD, F. S., Fitchburg, Mass. (Gas Sales of N. E.)
COONEY, E. J., Lowell, Mass.
COOPER, STUART, Charleston, S. C. (Southern)
CRONE, F. W., New York, N. Y. (Empire State G. & E.)
DRURY, N. B., San Francisco, Calif. (Pacific Coast)
FENNIMAN, J. R., New York, N. Y.
FISHER, R. E., San Francisco, Calif.
FRANK, M. H., Fond du Lac, Wis.
FRANKLIN, S. J., Millville, N. J. (New Jersey)
GOULD, WILLIAM, Boston, Mass. (N. E. Gas. Eng.)
GREEN, H. L., Waterloo, Ia. (Iowa)
HALLADAY, G. D., Grand Rapids, Mich. (Michigan)
HAWES, A. W., Jr., Baltimore, Md.
HUMM, A. W., New York, N. Y.
JANSEN, F. A., Ottawa, Ont., Can. (Canadian)
LIGHTBODY, JAS., Vancouver, B. C.
McMAHON, J. J., Cleveland, O.
MORRIS, H. C., Dallas, Texas. (Southwestern)
MULLANEY, B. J., Chicago, Ill. (Illinois)
MYERS, G. L., Portland, Ore.
POTTER, CLYDE H., Los Angeles, Cal.
ROLSTON, R. J., Philadelphia, Pa. (Pennsylvania)
SHEPARD, I. C., Evansville, Ind. (Indiana)
SOULES, E. E., Chicago, Ill.
STARR, L. K., Atlanta, Ga.
WATT, A. C., New York, N. Y.

CHAIRMEN OF SECTIONAL COMMITTEES ORGANIZED TO DATE

Contact With State Information Bureaus—J. S. S. RICHARDSON, Philadelphia, Pa.

Nominating—F. W. CRONE, New York, N. Y.

What Some Public Utility Men Have Said About Advertising

IN OUR EXPERIENCE the most effective way of getting business is through newspaper advertising."

"I do not know any better way to increase your load factor than by increasing the load factor of your local press by advertising very steadily."

"Daily newspaper advertising, properly written, and persistently presented to the public, has had the result of so increasing the demand for our product that in the downtown district and the thickly settled residence districts our business is obtained from people who first invite us to call on them."

—SAMUEL INSULL.

"I am a confirmed believer in the value of advertising and publicity for public utilities. Under the modern day system of public regulation, the utility company can have no secrets. Much of the antagonism against public utilities, which formerly existed and which is not yet entirely removed, is due to lack of correct information on the part of the public. If the public is not given correct information it will form opinions and draw conclusions based on misinformation. It should be the aim of the utility company, therefore, to advertise itself at every opportunity and give the public the facts concerning its operations.

"The up-to-date merchant with goods to sell, displays his wares and tells of their good qualities. The utility company has service to sell and must adopt the methods used by the successful merchant. It must display its wares and call attention to their quality. In the way of merchandising its products and cultivating the good-will of its customers, the public utility company must advertise if it is to be successful."

—BRITTON I. BUDD.

"Utility companies now recognize that consistent advertising is necessary in order to enable them to sell their services and merchandise, and that it enables the

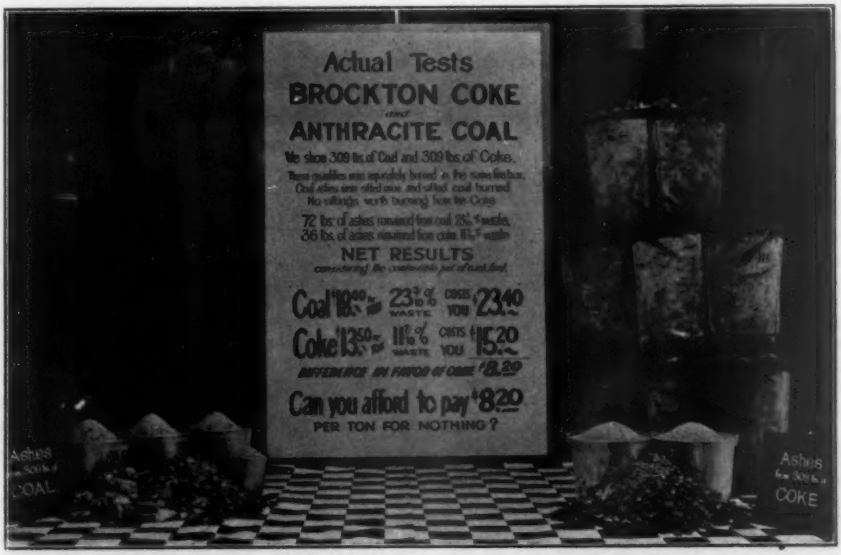
public to understand better the problems of the utility companies."

—CHARLES A. MUNROE.

"Advertising is merely telling your neighbors and the world what you wish to have them know about yourself or some institution in which you are interested. With the tremendous aggregations of people in the communities of our present-day civilization, and the great mass of individuals, institutions, products and places, to the existence and merits of which publicity is being given, the importance of advertising becomes much greater than in the older days when life was simpler, and lack of quick and cheap transportation and communication narrowed human activities to a radius within which they could easily become known by personal observation and word-of-mouth communication.

"Of particular importance is advertising to the public utilities, as their motives and principles are likely to be misunderstood, and constant publicity is worth while. Their interests demand that the new features of their business, which are of almost daily occurrence, should be brought quickly to the attention of their community, and perhaps of greatest importance, they owe a reciprocity to that other great public utility, the press, which cannot exist without income, which is too often scant, and the responsibility for the support of which, on a basis consistent with independent thought and fair and wholesome criticism, rests upon the thinking reputable institutions of the community, among the leaders of which the public utilities should always be found."

—JOHN F. GILCHRIST.



A unique coke window display made by the Brockton Gas Light Company, Brockton, Mass.

Concerning French Heels and Gas Ranges

SOME TIME AGO a certain writer demanded to know, editorially, if civilization, as we call it, was not retracing its steps back to the cave man era. As evidence he pointed to the growing use and influence of pictures on modern thought.

Without acknowledging the truth of his first proposition, we must admit the validity of the second. As advertisers of gas and gas appliances we are consistent users of pictures. Sometimes, however, we forget that the picture which we employ to illustrate our message is something more than a mere embellishment of copy. In short, there is, after all, some justification for the good natured fling which a critic has taken at us in advertising and selling:

"Is the female of the species less human than the male?" he asks. "Does she look with scorn upon pictures of every-day life as it is really lived? Agnes Anderson says not.

"Agnes is my stenographer. She is wearing a diamond ring on a certain—a very certain—finger of her left hand. And so, quite naturally, she is taking considerable interest in matters pertaining to the household.

"A few days ago I showed Agnes a couple of advertisements featuring kitchen scenes. One was an elaborate affair, equipped with the most superlative fixtures. A highly decorated and very Frenchy French maid could be discerned flitting about the background. Altogether a very attractive picture. The other was a mere kitchenette, of the variety usually found in small furnished apartments. A very bridish appearing young woman, in a captivating bungalow aporn, presided over the simple scene.

"And here is what happened: The elaborate advertisement fell to the floor unheeded, while Agnes feasted upon every detail of the humble scene. The first picture meant nothing in her young life. The second ad represented a very definite picture of the kitchen she hoped some day to possess.

"And speaking of French maids, one of these bright sunshiny days, somebody —goodness only knows who—is going to write a book titled, 'How to Dress Servants for the Advertising Columns.'

"I have often caught myself wondering what would happen if some maid-of-all-work, dressed as the advertising artists are wont to picture her—high heels, elaborate bows, silk hose, etc.—were to ring the door-bell of a real American home in quest of employment."

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Publicity requires iteration and reiteration and damnable reiteration.

—Chief Justice Taft

Soliciting Complaints

IT IS HUMAN NATURE not to stir up the muddy spring of trouble any more than is absolutely necessary. And no one is more anxious to avoid trouble, as a rule, than the local gas company. Nevertheless, there are times when looking for trouble may be the best of policies.

In the first place, it was a good old maxim that told us, "a stitch in time saves embarrassing moments." Trouble at the flood is more difficult to handle than at the source. In the second place, trouble is not always vocal. A customer may feel dissatisfaction without knowing exactly what the cause of his dissatisfaction is. In most cases his dissatisfaction will reach the stage of a complaint only when it becomes intolerable. Localize his pain, relieve it, and he will be eternally grateful. Psychoanalysis owes all of its triumphs to this truth.

Gas companies more and more are adopting the policy of encouraging the public to bring its gas troubles to the complaint office; in other words, to let off steam where it can be harnessed to do constructive work.

"We don't know just which gas company first conceived the idea that perhaps leaving the public alone was just the opposite course to be taken," says the Tuscon (Ariz.) *Star*. "But some company looked at the situation that way and started to remedy it. Others followed. Now the public utilities of hundreds of cities are stepping out and meeting the public. They are finding the public fair and willing to act reasonably, and the public, as a whole, has found that the gas companies are merely human institutions, doing their very best and honestly striving to give a dollar of real service for every dollar received.

"Pick up almost any newspaper in the country and you will see public utilities advertisements that tell light, gas and power users how to keep their bills down, how to get the best results from using the least fuel, what kind of utensils to use to save gas, and a score of other things that benefit the consumer. What they may lose in actual cash by these methods, the public utilities gain in good will."

L. J. Langford, president of the Southern Association of Gas Engineers and Managers, of England, calls this policy "passing beyond the meter." He emphasized the fact that "efficiency in gas service is equally as important as efficiency in manufacture."

"This," he remarks, "brings us to the question as to whether there will not be wisdom on our part, throughout the industry, in going beyond that obligation, and extending our interest to the efficient working of consumers' appliances.

"Complaints received at the office of inefficient service, though promptly remedied and probably small in number, are no criteron that those who do not complain are satisfied. We cannot expect all consumers to take upon themselves the cleaning and adjusting of appliances, neither can we expect them to know if such appliances are extravagant in consumption, or obsolete. Surely such responsibility devolves upon gas undertakings; and, by accepting it, we shall go a long way towards winning the confidence of our consumers, which must inevitably prove mutually advantageous."

In a certain English town, Mr. Langford reports, a squad of trouble snipers from the gas company made an inspection of 105 houses. Out of these they found five per cent of the lighting burners defective; ten per cent of the water heaters; thirteen per cent of the space

heaters; and fourteen per cent of miscellaneous appliances. In room heaters the defects were due to broken radiants, incorrect adjustment, obsolete patterns and inefficient ventilation. Ranges required spare parts, adjustments, valve tightening, etc.; and water heaters needed cleaning. No complaints had been received. Yet, it is ten to one that in every one of these homes the gas company was blamed for inefficient service until the real fault was traced and remedied.

In a large city, of course, it is manifestly impossible to make these periodic inspections on a large scale. Nevertheless, the realization that similar conditions exist everywhere should spur the gas company to bring these defects, if possible, out into the open.

The Pacific Gas and Electric Company has found a way which should recommend itself to others.

"During the year," it reports, "a great number of our consumers, particularly the large users of gas and electricty, were circularized with a letter expressing the company's appreciation of their business, defining its service and calling attention to the engineering assistance which the company maintains to improve the efficient use of its commodities. This was followed by a systematic canvass in which such engineering assistance was placed at the consumer's disposal.

"This has given very excellent results in both service and sales. In an endeavor to ascertain what our existing consumers thought of the service being rendered them by this company, return postal cards were mailed to all consumers in which they were asked whether the service being rendered was satisfactory, and, if not, requesting their suggestions for improvement. They were also encouraged to advise the company of any complaints having been made that had not been given prompt and proper attention, as well as to indicate any discourtesy on the part of the employees of the company."

Which reminds us, by the way, why a "complaint" department? "Adjustment" or "Service" sounds ever so much better—and considerably more accurate.

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A Chance for Some Publicity

The American Institute of Baking is planning a great cooperative advertising display in connection with the national convention of the American Bakers Association at Atlantic City in September. All of the big advertisers of food products who have been displaying their goods with bread, toast or other bakery products have promised to prepare displays as part of this exhibit.

A portion of this exhibit will be devoted to Toast Campaigns, another to special baking advertising. The Institute would like to get from some of our members examples of any display material or publicity matter which has been used as parts of toast campaigns or cooperative sales plans. Communications should be addressed to Mr. L. A. Rumsey, American Institute of Baking, 1135 Fullerton Avenue, Chicago, Illionis.

Power-House Operator at Switchboard Controlling Thousands of Horsepower

LIFE is a stage," said Shakespeare, "whereon every man must play a part . . .

So too, the rendering of Consumers Power Service. The stage—Michigan. The players—over 3,000 men and women. As on the real stage, the players must constantly *think*, follow the course of action, and be ready at the moment of their turns.

"Think!"—that one word means much to you and to your community. The employes of Consumers Power Company are trained to think and to put thoughts into action that focuses upon their goal: making Consumers Power Service to you Good Service.

For example—in the power plants and substations. In this great superpower system serving 128 Michigan cities and towns—with 1,300 miles of interconnecting high power tower lines and over 9,000 miles of city lines—great skill must be used in handling the switches that control these lines—carrying nearly a quarter-million horsepower.

When storms thunder across the state, these arteries must be protected—if lightning tears at certain lines, the others must be kept clear that service may go on. In the midst of the flash and roar—while lightning arresters hiss—cool heads and hands are cutting switches in and out almost as swift as the lightning—cutting out damaged circuits—looping service around the trouble zones—drawing power from new sources as can be done in the Consumers Power system serving you from 36 power plants.

Why? They are prepared for the emergency. The many possible sources of trouble have been studied and provided for. Every move has been learned and rehearsed. And when trouble strikes—even though unforeseen as it sometimes is, trained forces are on the firing line with their battle cry—"THINK WHICH, THEN SWITCH!"

To you, whether in your home, or in store or factory—it is a passing storm; but through it all—working for you—stands Consumers Power Service.

CONSUMERS POWER COMPANY

More of the Consumers Power Company's Good-will Ads.

Why Public Utility Securities are Recommended

AFTER A CAREFUL analysis of the security field, C. W. Barron has set forth a list of reasons why brokers recommend the purchase of public utility securities.

Some of the reasons, as printed in the Consolidated Investors News, are as follows:

An Essential Business

Public utility companies conduct a business which is essential to our home life. They supply us with such necessities as gas, electric light and power, heat, street railways, and telegraph and telephone service.

Stability of Earnings

Public utility companies are practically unaffected by periods of business depression. The very nature of their business makes for stability of earning power. People must have gas, light and heat whether times are good or bad. The deflation period of 1921 affected utilities only to a slight degree.

Minimum Competition

The public utility business is practically a monopoly and the companies operate usually without competition.

Cash Business

The business is practically on a cash basis.

No Bad Debts

The possible loss through bad debts is reduced to a minimum and money is not tied up for long periods as is frequently the case in other businesses.

No Bulky Inventories

The products of public utility companies are manufactured only as needed and are sold direct to the consumer. Consequently, there are no large surplus stocks to carry, and no heavy inventories which might be subject to depreciation in value.

Customer Ownership

The increasing ownership in recent years of public utility securities by customers has promoted a much better feeling between the companies and the public.

Increased Demand for Electricity

The constantly increasing use of electric power is making heavy demands on utility companies. Railroad electrification projects, development of new electrical labor-saving devices in the home, power for manufacturing and industrial concerns, increased lighting facilities for homes and stores, and power-driven machinery on the farms, have greatly extended the field of those companies that furnish electric power.

Careful Supervision

The interests of public utility security holders are adequately safeguarded by state laws and regulations. Careful restrictions surround the issuance of securities, and rates and service rendered are also subject to state supervision. These regulation policies of state commissions are an exceptionally strong factor in favor of utilities.

Efficiency of Operation

The centralized control of utility con-

cerns makes for efficiency of operation. Operating costs of most companies are well in hand and consume a minimum of gross. The labor situation is a negligible factor with utilities.

Assured Progress

No community can make real progress without the aid of the utility company. It is essential to the welfare of the people and its growth keeps pace with that of the section served. The growth and progress of the utility concern are limited only by the activities of the people served.

Consistent Earning Power

The consistent upward trend of utility earnings, both gross and net, during the past fifteen years, is convincing proof of their real merit. Their record is one of real accomplishment.

The majority of investors believe that when they put money into a concern they are buying property. They would be far more successful if they realized that in the majority of instances they were not investing in property, but in management, for management in business enterprise is the major half.

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Some Suggestions

HAVE A WELL DEFINED advertising policy. This includes a budget and a program. Intermittent and occasional advertising is usually ineffective; regularity is sure to bring results. Ascertain how frequently you can place an advertisement, and how much space you can take; then lay out a schedule of the dates on which you wish your "advertisement" to appear.

Arrange with your newspaper to have your "advertisement" well placed. Regularity of place and general style of copy increase the value of your advertising.

Furnishing your newspapers with information in advance, as to dates and space required, facilitates getting what you want when you want it.

Whenever possible let your window display supplement your newspaper advertising. Have the articles you advertise in the papers shown in the windows.

Writing good copy is largely a matter of telling plain facts, plainly to plain people.

Never abbreviate unless absolutely necessary.

Bold face type and "capitals" are only for emphasis and should be used judiciously. Emphasis overdone destroys itself entirely.

Matter printed in upper and lower case type is easier to read than if printed in all capitals.

Eliminate unnecessary words. Advertising stories told in the fewest words, consistent with a clear understanding, get the most readers.

Plenty of white space is always a good "setting" for your advertisement. Advertisements crowded with type matter are usually unattractive.

Whenever possible check results obtained from any special piece of copy, and file the information in your advertising record book.

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MANUFACTURERS SECTION

G. W. PARKER, Chairman — E. E. BASQUIN, Vice-Chairman

C. W. BERGHORN, Jr., Secretary

MANAGING COMMITTEE—1924

AARON, C. T., Boston, Mass.
ABBOTT, M. E., Taunton, Mass. (Gas Sales of N. E.)
BARTLETT, C. E., Philadelphia, Pa. (New Jersey)
CRANE, W. M., New York, N. Y.
DEHART, J. S., Jr., Newark, N. J.
FAIRCHILD, S. E., Jr., Ambler, Pa.
FOWLER, W. M., Philadelphia, Pa.
GRADY, S., Philadelphia, Pa. (Pennsylvania)
GREENE, J. J., New York, N. Y.
HOBBS, C., Toronto, Ont., Canada. (Canadian)
KING, T., Pittsburgh, Pa.
MCCULLOUGH, CHARLES, Milwaukee, Wis. (Wisconsin)
MCDONALD, DONALD, New York, N. Y.
MCILHENNY, J. D., Jr., Philadelphia, Pa.
NORMAN, E. A., New York, N. Y.
NORTON, ARTHUR E., Boston, Mass. (N. E. Gas Eng.)
PARKER, JOHN F., Rockford, Ill. (Indiana)
RAMSBURG, C. J., Pittsburgh, Pa.
ROPER, G. D., Rockford, Ill. (Illinois and Iowa)
SEIDENGLANZ, C. H., Pittsburgh, Pa. (Southwestern)
SMITH, W. L., Battle Creek, Mich. (Michigan)
STITES, TOWNSEND, Gloucester, N. J.
STOCKSTROM, A., St. Louis, Mo. (Missouri)
WHETSTONE, W., Philadelphia, Pa.
WILSON, H. A., Newark, N. J.
WOLFE, A. McW., Baltimore, Md. (Southern)

CHAIRMEN OF SECTIONAL COMMITTEES ORGANIZED TO DATE

Exhibition—GEO. W. PARKER, St. Louis, Mo.
Nominating—F. A. LEMKE, Kalamazoo, Mich.
Division of Accessories Manufacturers—H. A. WILSON, Newark, N. J.
Division of Apparatus & Works Manufacturers—S. F. FAIRCHILD, Ambler, Pa.
Division of Gas Range Manufacturers—CHAS. T. AARON, Boston, Mass.
Division of Heating Appliance Manufacturers—THOMSON KING, Pittsburgh, Pa.
Division of Industrial Appliance Manufacturers—WALTER WHETSTONE, Philadelphia, Pa.
Division of Lighting Appliance Manufacturers—TOWNSEND STITES, Gloucester, N. J.
Division of Meter Manufacturers—J. D. MCILHENNY, Jr., Philadelphia, Pa.
Division of Office Labor Saving Devices—E. A. NORMAN, New York, N. Y.
Division of Water Heater Manufacturers—W. M. FOWLER, Philadelphia, Pa.
Division of Supply Manufacturers—J. J. GREENE, New York, N. Y.

How the 1924 Exhibition is Coming Along

THE FOLLOWING 126 manufacturer company members of the Association have applied for space at our Sixth Annual Convention, this list being complete up to June 11.

These companies have reserved 86 per cent of total space available. The table below indicating the rate at which applications were received is interesting. The exhibition prospectus was mailed to our Western members on May 10 and to our Eastern members on May 12.

The changes which the Pier authorities have completed by enclosing the entire exhibition area with permanent roofing; by a tongue and grooved flooring; by improved lighting facilities; and in many other details have made the Steel Pier one of the most satisfactory exhibition halls in the country.

Manufacturers who have not already applied for space are earnestly urged to do so without any delay to insure their representation at what will probably be the largest gas exhibition ever held.

Date	*Number of Exhibitors*	*Number of spaces applied for*	*Area in Sq. Ft. Reserved*
Reserved for Special Exhibits	8	11	1250
May 13	20	34	5275
May 14	16	22	3814
May 15	21	33	4177
May 16	4	5	637

Date	*Number of Exhibitors*	*Number of Spaces Applied for*	*Area Sq. Ft. Reserved*
May 17	2	4	428
May 19	5	9	840
May 20	6	8	1300
May 21	2	2	200
May 22	3	5	500
May 23	5	5	754
May 24	1	2	200
May 26	6	9	1094
May 27	2	3	310
May 28	2	2	325
May 29	4	5	617
June 2	5	6	576
June 4	7	7	704
June 5	2	4	400
June 9	3	3	300
June 10	1	1	100
June 11	1	1	104
	126	181	23,905

List of Exhibitors to Date

A-B Stove Co., Battle Creek, Mich.
Accounting Section, A. G. A., New York, N. Y.
American Gas Journal, New York, N. Y.
American Manufacturing Co., The, Dayton, Ohio
American Meter Co., New York, N. Y.
American Range & Foundry Co., Chicago, Ill.
American Stove Co., Chicago, Ill.
Baltimore Gas Appliance & Mfg. Co., The, Baltimore, Md.
Bartlett Hayward Co., The, Baltimore, Md.
Beckwith Co., The, Dowagiac, Mich.
Blodgett Co., The, G. S., Burlington, Vt.
Bridge & Beach Mfg. Co., St. Louis, Mo.
Bryant Heater & Mfg. Co., The, Cleveland, O.
Burroughs Adding Machine Co., Detroit, Mich.
Chambers Mfg. Co., Shelbyville, Ind.
Chicago Bridge & Iron Works, Chicago, Ill.
Chicago Pneumatic Tool Co., New York, N. Y.
Clark & Co., Div., Geo. M., Chicago, Ill.
Cleveland Co-Operative Stove Co., The, Cleveland, O.
Cleveland Gas Meter Co., Cleveland, O.
Cleveland Heater Co., Cleveland, O.
Clow & Sons, James B., Chicago, Ill.
Combustion Utilities Corp., New York, N. Y.
Commercial Gas Appliance Co., Baltimore, Md.
Connelly Iron Sponge & Governor Co., New York, N. Y.
Connersville Blower Co., Connersville, Ind.
Crane Company, Chicago, Ill.
Crane Co., Wm. M., New York, N. Y.
Cribben & Sexton Co., Chicago, Ill.
Cruse-Kemper Co., Ambler, Pa.
Cutler Hammer Mfg., Co., The, Milwaukee, Wis.
Dangler Stove Co., Div., Cleveland, O.
Dean, Payne, Ltd., Stamford, Conn.
Detroit Stove Works, Detroit, Mich.
Dresser Mfg. Co., Bradford, Pa.
Elliott-Fisher Co., New York, N. Y.

Equitable Meter Co., Pittsburgh, Pa.
Eriez Stove & Mfg. Co., Erie, Pa.
Estate Stove Co., The, Hamilton, O.
Foxboro Co., Inc., The, Foxboro, Mass.
Gas Age-Record, New York, N. Y.
Gas Industry, Buffalo, N. Y.
Gas Machinery Co., The, Cleveland, O.
Gas Purifying Materials Co., Long Island City, N. Y.
General Gas Appliance Co., New York, N. Y.
General Gas Light Co., Kalamazoo, Mich.
General Gas Mantle Co., Camden, N. J.
Grayson Mfg. Co., The, J. H., Athens, O.
Griffin & Co., John J., Philadelphia, Pa.
Hays Mfg. Co., Erie, Pa.
Helme & McIlhenny, Philadelphia, Pa.
Hoffman Heater Co., The, Lorain, O.
Humphrey Co., Kalamazoo, Mich.
Improved Equipment Co., New York, N. Y.
Intercolonial Gas Journal of Canada, Hamilton, Ont., Can.
Isbell-Porter Co., Newark, N. J.
Johns-Manville, Inc., New York, N. Y.
Kane Mfg. Co., Inc., Wm., Philadelphia, Pa.
King Refractories Co., Inc., Buffalo, N. Y.
Koppers Co., The, Pittsburgh, Pa.
Lattimer Stevens Co., The, Columbus, O.
Lawrence Leather Co., A. C., Boston, Mass.
Lawson Mfg. Co., Pittsburgh, Pa.
Lovekin Water Heater Co., The, Philadelphia, Pa.
McDonald & Co., D., Albany, N. Y.
Magee Furnace Co., Boston, Mass.
Maryland Meter Works, Baltimore, Md.
Metric Metal Works, Erie, Pa.
Michigan Stove Co., The, Detroit, Mich.
Mirror Patented Stove Pipe Co., Inc., The, Harford, Conn.
Milwaukee Gas Specialty Co., Milwaukee, Wis.
Mueller Co., Decatur, Ill.
National Stove Co., Div., Lorain, O.
National Tube Co., Pittsburgh, Pa.
New Process Stove Co., Div., Cleveland, O.
Partlow Corp., The, Utica, N. Y.
Peerless Heater Co., Pittsburgh, Pa.
Peerless Mfg. Co., Louisville, Ky.
Pennsylvania Engineering Works, New Castle, Pa.
Philadelphia Stove Co., Philadelphia, Pa.
Pioneer Coal & Coke Co., New York, N. Y.
Pittsburg Water Heater Co., Pittsburgh, Pa.
Public Utilities Reports, Washington, D. C.
Quick Meal Stove Co., Div., St. Louis, Mo.
Quigley Furnace Specialties Co., New York, N. Y.
Radiant Heat Corp. of America, New York, N. Y.
Rathbone Sard & Co., Aurora, Ill.
Reliable Stove Co., Div., Cleveland, O.
Remington Typewriter Co., Inc., New York, N. Y.
Roberts Brass Mfg. Co., The, Detroit, Mich.
Roberts & Mander Stove Co., Philadelphia, Pa.
Robertshaw Thermostat Co., Youngwood, Pa.
Roots Co., The, P. H. & F. M., Connersville, Ind.
Roper Corp., Geo. D., Rockford, Ill.
Russell Engineering Co., St. Louis, Mo.
Ruud Mfg. Co., Pittsburgh, Pa.
Safety Gas Lighter Co., Lynn, Mass.
Sands Mfg. Co., The, Cleveland, O.
Schaeffer & Budenberg Mfg. Co., The, Brooklyn, N. Y.
Sexton Stove & Mfg. Co., The S. B., Baltimore, Md.
Sill Stove Works, Rochester, N. Y.
Slattery & Bros., Inc., J. B., Brooklyn, N. Y.

Sprague Meter Co., The, Bridgeport, Conn.
Steere Engineering Co., Detroit, Mich.
Superior Mfg. Co., The, Pittsburgh, Pa.
Superior Meter Co., Brooklyn, N. Y.
Surface Combustion Co., The, New York, N. Y.
Tappan Stove Co., The, Mansfield, O.
Time-O-Stat Corp., Milwaukee, Wis.
Tinnerman Stove & Range Co., Cleveland, O.
Tufts Meter Works, Nathaniel, Boston, Mass.
U. G. I. Contracting Co., The, Philadelphia, Pa.
U. S. Bureau of Mines, Washington, D. C.
U. S. Bureau of Standards, Washington, D. C.
U. S. Cast Iron Pipe & Foundry Co., Burlington, N. J.
Walker & Pratt Mfg. Co., Boston, Mass.
Weir Stove Co., Taunton, Mass.
Welsbach Co., Gloucester, N. J.
Western Gas Construction Co., The, Fort Wayne, Ind.
West Gas Improvement Co. of America, New York, N. Y.
Wheeling Corrugating Co., Wheeling, W. Va.
White-Warner Co., Taunton, Mass.
Wilder Metal Co., Niles, O.
Wilson Co., H. A., Newark, N. J.
Wolff Gas Radiator Co., The, A. H., New York, N. Y.

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Oriole Show Room, 20 East 44th Street, New York City

The New Show Room of the Baltimore Gas Appliance and Manufacturing Company

INDUSTRIAL GAS SECTION

H. H. CLARK, Chairman — H. O. LOEBELL, Vice-Chairman

C. W. BERGHORN, Jr., Secretary

MANAGING COMMITTEE—1924

ALLINGTON, J. B., Rochester, N. Y.
ANDREW, H. O., New York, N. Y.
BROUGHTON, H. E., Jackson, Mich. (Michigan)
CAULEY, F. F., Chicago, Ill.
CLARK, H. H., Chicago, Ill. (Illinois)
CRAWFORD, H. M., San Francisco, Cal.
DE CORIOLIS, E. G., Boston, Mass.
GALBRAITH, L. F., Oakland, Cal. (Pacific Coast)
HARDING, D. J., York, Pa. (Pennsylvania)
HENRY, H. M., Pittsburgh, Pa.
HEPBURN, W. M., New York, N. Y.
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KRAUSSE, C. C., Baltimore, Md.
LAFORE, P. J., Boston, Mass.
LEINROTH, J. P., Newark, N. J.
OSTERMAN, P. C., Elizabeth, N. J.
QUINN, J. J., Quincy, Mass. (N. E. Gas Eng.)
RAMSAY, R. E., Philadelphia, Pa.
RASCH, W. T., New York, N. Y.
SCHUETZ, A. A., Milwaukee, Wis. (Wisconsin)
SELLMAN, N. T., New York, N. Y.
SLIMPIN, C. D., Montreal, Can. (Canadian)
STAHL, C. R., Davenport, Ia. (Iowa)
STEPHANY, E. J., Pittsburgh, Pa.
THOMPSON, W. D., Hammond, Ind.
VITTINGHOFF, H., Boston, Mass.
WATSON, H. E. G., Toronto, Can.
YEATON, G. D., Providence, R. I. (Gas Sales of N. E.)
YOUNG, A. W., Knoxville, Tenn. (Southern)
YOUNG, R. R., Newark, N. J. (New Jersey)

CHAIRMEN OF SECTIONAL COMMITTEES ORGANIZED TO DATE

Convention Program—F. F. CAULEY, Chicago, Ill.
Cooperation with "Industrial Gas"—N. T. SELLMAN, New York, N. Y.
Educational—R. R. YOUNG, Newark, N. J.
Industrial Booklets—
Combustion—H. O. LOEBELL, New York, N. Y.
Hotel & Restaurant Uses—J. P. LEINROTH, Newark, N. J.
House Heating—E. D. MILENER, Baltimore, Md.
Large Volume Water Heating—W. T. RASCH, New York, N. Y.
Steam Boilers—H. VITTINGHOFF, Boston, Mass.
Wholesale Baking—H. M. HENRY, Pittsburgh, Pa.
1000 Uses for Gas—H. H. CLARK, Chicago, Ill.
Ceramics—C. C. KRAUSSE, Baltimore, Md.
Drying—J. ZANDOR, Chicago, Ill.
Food Products—E. J. STEPHANY, Pittsburgh, Pa.
Forging & Heat Treating—W. D. THOMPSON, Hammond, Ind.
Soft Metal Melting—W. M. HEPBURN, New York, N. Y.
Tank Heating—OSCAR BOWEN, Chicago, Ill.
Nominating—F. F. CAULEY, Chicago, Ill.

The Industrial Gas Section's Officers

Horace H. Clark

MR. HORACE H. CLARK, the Chairman of the Industrial Gas Section, although he has devoted his entire time to the gas industry, was graduated from the Missouri School of Mines in 1905 with the degree of mining engineer. He served his apprenticeship with the Laclede Gas Light Company of St. Louis as draftsman, cadet engineer, chemist and street foreman.

In 1908 he became first identified with the Insull companies as chemist at the Oak Park gas works of the Northwestern Gas Light & Coke Company and later became assistant superintendent there. When the Public Service Company of Northern Illinois took over the Northwestern Gas Company, Mr. Clark

became engineer of gas distribution of the former company.

When, in 1915, the industrial gas department was organized, he was appointed industrial gas engineer which position he occupied until 1920 when he was transferred to a similar position with the Peoples Gas Light and Coke Company, Chicago, Ill. For the past three years, Mr. Clark has been doing consulting work, principally in gas utilization for the Insull interests, more especially for the Peoples Gas Light and Coke Company.

Mr. Clark has always been intensely interested and active in both national and state association work in the industry. He has been on many committees of the American Gas Association and is a past president of the Illinois Gas Association. In addition he is an active member of the American Institute of Mining and Metallurgical Engineers, the American Chemical Society, the American Society for Steel Treating and the American Ceramic Society.

Mr. Henry O. Loebell, the Vice-Chairman of the Industrial Gas Section, first entered the gas industry in 1904 when he became affiliated with the Denver Gas and Electric Company, doing research work in the laboratory.

Not deterred by the lack of a technical education, Mr. Loebell set about acquiring one by reading, study and carefully following the early experimental work of Henry L. Doherty in Denver.

From 1904 until 1909, Mr. Loebell continued his laboratory investigations, and then for three years served the Spokane Gas and Fuel Company, Spokane, Wash., as industrial engineer and later as business manager. While in Spokane he was largely instrumental in establishing an industrial fuel school. Leaving the Pacific Coast in 1912, he came to New York to occupy the position of industrial fuel engineer for the Henry L. Doherty Company.

Henry O. Loebell

Since 1912 Mr. Loebell has taken care of practically all matters and problems of that company relative to heating with both natural and artificial gas. He now occupies the position of president of the Surface Combustion Company.

Mr. Loebell has always been not only active, but intensely optimistic in the industrial field, dreaming of the day when gas could be manufactured and sold at such a low price that coal and oil would be eliminated from everyday use in all heating operations.

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Bread Baking on Large Scale

Oven dimensions—9 ft. by 70 ft.

Oven Capacity—2,500 lbs. bread per hour

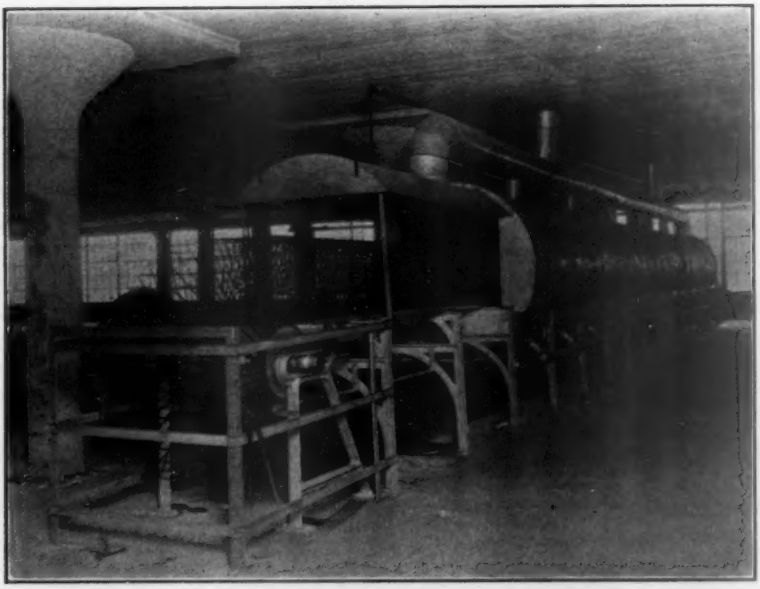
B.t.u. consumption per hr.—1,890,000

B.t.u. consumption per 1,000 lbs. dough—756,000

B.t.u. consumption per month—1,155,000,000

Gas in the Making of Tin Cans

LITHOGRAPHING
Capacity—3,000 plates (24" x 36") per hr.
Gas Consumption—500 cu. ft. per hr.



LACQUERING
Capacity—4,000 plates (24" x 36") per hr.
Gas Consumption—600 cu. ft. per hr.

COMMERCIAL SECTION

J. E. DAVIES, Chairman — J. P. HANLAN, Vice-Chairman

LOUIS STOTZ, Secretary

MANAGING COMMITTEE—1924

BALL, FRANK L., Fitchburg, Mass.
BRILL, A. P., Pittsburgh, Pa.
BURKE, E. J., Indianapolis, Ind. (Indiana)
BURNS, J. J., St. Louis, Mo.
CANNIFF, R. J., Poughkeepsie, N. Y.
CANTRELL, NORMAN, Chicago, Ill.
COEL, WILEY F., St. Louis, Mo. (Missouri)
CRAFTS, H. C., Pittsfield, Mass. (N. E. Gas Eng.)
CRANKSHAW, J. W., Allentown, Pa. (Pennsylvania)
CURTIS, C. C., Fall River, Mass.
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DOERING, H. A., Mt. Vernon, N. Y. (Empire State G. & E.)
FUGATE, F. S., Detroit, Mich. (Michigan)
GALBRAITH, L. F., Oakland, Calif. (Pacific Coast)
JOHNSON, W. B., Toronto, Can. (Canadian)
JONES, JACOB B., Bridgeton, N. J. (New Jersey)
KARSHNER, G. M., New York, N. Y.
KENNEDY, T. F., New York, N. Y.
KING, THOMSON, Pittsburgh, Pa.
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MARTIN, E. H., Des Moines, Ia. (Iowa)
MCCONNELL, H. N., New York, N. Y.
PICKARD, B. F., Greensboro, N. C. (Southern)
PHENICIE, C. R., Green Bay, Wis. (Wisconsin)
QUINN, JOHN J., Quincy, Mass. (Gas Sales of N. E.)
RASCH, W. T., New York, N. Y.
SMITH, D. R., Baltimore, Md.
SMITH, W. L., Battle Creek, Mich.
VINCENT, G. I., Syracuse, N. Y.
WEISER, J. A., York, Pa.

CHAIRMEN OF SECTIONAL COMMITTEES ORGANIZED TO DATE

Architects and Builders Service—W. A. ADAMS, Chicago, Ill.
Commercial Policy—P. S. YOUNG, Newark, N. J.; CHAS. A. MUNROE, Chicago, Ill.; F. J. RUTLEDGE, Philadelphia, Pa.; R. B. BROWN, Milwaukee, Wis.; F. R. BARNITZ, New York, N. Y.
Home Service—ADA BESSIE SWANN, Newark, N. J.
Salesman's Manual—H. D. VALENTINE, Chicago, Ill.
Sales Stimulation—J. P. HANLAN, Newark, N. J.

The A. G. A. Summer Sales Conference

Millbrook Inn, Millbrook, Dutchess Co., New York

August 3rd to 16th, 1924

AN IDEAL LOCATION has finally been found at Millbrook Inn, near Poughkeepsie, New York, for the location of the Association's First Experimental Summer Sales Conference.

Millbrook Inn is a garden spot, located on a 40-acre tract, having complete and first class appointments and service. There will be no distractions from transient guests as our members and families will reserve practically the entire accommodations available.

The Conference will accommodate two groups, limited to 50 members each, and their wives,—the first group may arrive Saturday or Sunday, August 2nd or 3rd, and must depart not later than Saturday afternoon the 9th; the second group will arrive Saturday the 9th and depart the following Saturday, when the Conference will end. Those who may wish to remain after August 16 can make arrangements with the management of the Inn.

The idea of such a unique conference was first suggested at a meeting of the Managing Committee of the Commercial Section in Chicago in March. The response of those present was instant and enthusiastic, in fact so much so, that there seemed to be no question but that the new venture would be popular and successful.

It will be a direct tie-in with the Monthly Sales Service with its objective of a 50 per cent increase in gas sales in the next three years, recently inaugurated by the Commercial Section and, it is hoped, will bring about a better understanding of the potential possibilities for developing our present markets and for

The Inn

planning to reach our new and as yet undeveloped markets for the sale of gas.

The plan presents an opportunity for gas company executives and sales managers to spend a most profitable and enjoyable week, under particularly pleasant surroundings.

A regular schedule for each day will be planned and must be adhered to by each member attending. A business session of several hours will be held each morning from Monday to Friday inclusive, the afternoons being devoted to the various sports. The members in attendance will be expected to express themselves freely on the subjects under discussion. A report of the conference will be published and a copy sent to each attender.

The Conference being held during the vacation period of many members it will be welcome news to the married men that the ladies are invited and will enjoy the novelty of a really original and out of the ordinary vacation.

The recreation features will include golf, tennis, swimming, archery, baseball, volley ball, quoits, etc.

A well-laid-out, nine-hole golf course is immediately adjacent to the Inn. Green fees $10.00 weekly; $1.50 daily.

Auto bus—Poughkeepsie to Millbrook—$1.00 per passenger each way.

Garage facilities for 20 cars on the premises—$1.00 per day.

Reservations—accepted on a weekly basis only—

For members $70.00
For ladies 50.00

Covering all expenses, excepting transportation, green fees and garage rental.

The First Tee

Requests for reservations must be accompanied with remittance for one-half the fee.

In order to accommodate representatives from the largest number of company members, reservations will be made in the order of their receipt at Association headquarters, the Association further

The Lake

reserving the right to limit representation from any one company until every company applying for reservations has been accommodated.

Further detailed information may be obtained by addressing Louis Stotz, Secretary of the Commercial Section at Association headquarters.

The tentative program follows:—

Tentative Conference Program

To discuss ways and means for the greatest possible development of our present and new markets, and to stimulate the effort for reaching the objective of a 50 per cent increase in Gas Sales during the next three years.

Subjects:

New Business Development and Sales Stimulation.

Direct Advertising and House Organs.

How to use Newspaper Space to the Best Advantage.

Selection and Training of Sales Personnel.

A New Note in Business Adminstration.

Selling the Consumer Direct.

Effective Displays for Windows and Show Rooms.

Compensation for Sales Representatives.

Home Service.

Customer Ownership.

Gas Trade Cooperation.

The A.G.A. Central Testing Laboratory.

Selling Specification Goods.

Answer and discussion of queries from the Question Box.

Note:

Negotiations are now under way to secure forceful speakers who will lead the discussions on the subjects enumerated.

The Tennis Courts

As there will undoubtedly be many questions occuring to members on subjects which may not be related to the subjects above, but which will nevertheless be of real interest to everyone, a Question Box will be installed and the queries placed therein will be open to discussion on the last day of the Conference.

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The Monthly Sales Service

730 subscribers to June 1st

THE SUBSCRIBERS to the Monthly Sales Service received during May two mailings,—Special Report No. 1 relating to the "Campaign Method of Merchandising," also a bulletin setting up a June campaign for selling the "Kitchen Convenient" idea; a follow-up of the Water Heater Campaign; the second step in organizing an Industrial Department and suggestions for the Home Service Department.

There are still many men engaged in the sales development work for their respective companies who are not getting this service,—it will certainly repay any company to arrange for this service to go regularly to these men. One copy in a company is usually not sufficient to keep everybody, who has a responsible position in the Sales Department, posted on the many helpful suggestions and selling ideas appearing in the service.

We have heard some rather pleasing comments from our subscribers concerning this new service—have you seen it?

Getting Customers to Send in Names of Prospects

A plan which has been found to work successfully and which could be applied effectively by gas companies is to have the sales representative follow up every appliance sale with a service call after the installation is made. While there he presents the customer with a book of ten coupons. For every one of these coupons, giving the name of a prospect, sent in to the office that later develops into a sale, the original customer's account is credited with $1.00 or $2.00 or whatever amount may be decided upon.

Although this plan is not altogether new, it is an excellent method of securing leads which, if properly followed, will undoubtedly result in sales which would not otherwise be made.

New Financial Literature

Three recent publications dealing with the financial side of the public utility business are "Mighty Servants of Civilization," The National City Company, 55 Wall Street, New York; "Public Utilities," Harris, Forbes & Company, 56 William Street, New York; and "Public Utility Points," Bonbright & Company, 25 Nassau Street, New York. Sample copies may be obtained by writing direct to the publicity departments of the companies mentioned.

Building Service Through Home Service Departments

ADA BESSIE SWANN, Chairman Home Service Committee, American Gas Association.

Ada Bessie Swann

WHAT DOES SERVICE MEAN? Among the many definitions given, the one I like to choose as being the most fitting for the work of any Home Service Department is this: "Any work performed for the benefit of another."

Does not that definition in itself inspire you with a desire to have a Home Service Department in your gas company?

But let us go a step further and find our definition for Home. We find many in the dictionary, but I like to go back to one derived from the Anglo-Saxon, namely—"an endeared dwelling as the scene of domestic love and happy and cherished family life." Thus the word "Home" comes to signify any place of peace, rest and happiness.

So we have from our two words "Home Service"—any work performed for the benefit of peace, rest and happiness. What greater aim can any department of a gas company have? And just how does such a worthy and exalted ideal of a Home Service Department link itself with the work of a gas company?

There is now no policy in the gas business so universally recognized as that of *giving the very best service possible to gas consumers.*

First, through supplying a high quality of gas,

Second, through the handling of only the best gas appliances,

Third, through a profound attention to the complaints of the gas consumers, justified or imaginary,

Fourth, through the dissemination of information and honest advice.

These are the acknowledged essentials to the growth of the gas companies' business.

The Place of a Home Service Department

The place of a Home Service Department in a gas company is to build service through careful instruction of consumers. This instruction should enable them to get the best service, at the smallest operating cost, from their appliances. And these appliances should be selected by the gas company after careful and exhaustive tests that assure their being efficient, durable, faultless and economical. No gas appliance should be bought only because of a low purchasing price. Quality of service to be rendered should

be the determining factor in the selection of all gas appliances.

With this basis of a standard quality of appliances to work on, the problem of instructing the consumer is reduced to its smallest difficulty, and the gas company is assured that the expenses of such a department will be kept down to a minimum and that a contented patronage will naturally follow.

To keep closely in mind our Home Service work, let us call it from now on, in our discussion, "the instruction department" or educational department. This, of course, is divided into two classes, the "domestic" and "industrial." We will consider only the domestic side in this discussion.

One important point to call to your attention here is the giving of proper instruction at the proper time. That is, at the time of installation, not as so often occurs, two, three or four weeks after installation, after the customer may have become thoroughly disgusted and dissatisfied, ready to return the appliance and say all manner of hateful things about the gas company. This means the closest cooperation between the Home Service Department and the Maintenance Department.

How It Is Done

How is this instruction work carried on by a Home Service Department? In various ways. It is done through lectures by graduates of domestic science schools before women's clubs, schools and other organizations. It is done through women instructors, formerly called demonstrators. It is done by distributing well prepared "Hints and helps to the housewife," recipes, etc.

The domestic science graduate has already and still is doing wonderful work in creating a national and local demand for the best gas appliances for use in the home, in developing methods in economy in gas consumption, in improving home conditions, in uplifting women from drudgery to a comparative freedom and easier way of living, in showing the people that the gas company is a friend of the public, a benefactor of the people and an honored and respected business institution.

And how about the "home demonstration" or instruction?

This instructor who carries aid to the beginner, who lives as she does among kitchen blunders and old fashioned prejudices, helps the inexperienced, teaches the ignorant, makes cooks out of the undomesticated newly-weds. She helps the average cook to be a better cook, brings a new thought or new recipe to a home where "food monotony" is sowing a little seed of discontent. And, in so doing, she produces for the gas company results not only figured in dollars and cents, but in GOOD WILL—that without which no business organization can exist.

But how, you ask? By converting the dissatisfied customer into a contented and delighted consumer and a "tongue that telleth things to the neighbors." That means increased business.

It is a well known fact, that where a consumer, an inexperienced woman, is left to her own devices, say with a gas range, it is very seldom that the baking oven and less seldom that the broiler oven is used and that the range sold is the revenue producer it should be and could be made to be. A Home Service instructor shows how easy it is to operate the oven and broiler oven, teaches how foods are better when broiled or baked. And WE KNOW that the range becomes a revenue producer for the gas company.

Home Service Departments Paid

Now, I would like to say that such a department, though a considerable ex-

pense to the gas company, is a paying proposition, as it results in the proper use of the appliances, increases the gas output, reduces the work of the complaint and maintenance departments, and converts the "kicker" into a contented friend and booster for the gas company.

Because a Home Service Department cannot show in cold hard figures on the debit or credit side of the ledger each month what it has accomplished, some gas companies hesitate to organize such work. Would they abolish the accounting and purchasing departments because of their endless expense? They are two of the most important departments of an organization, financially. The results of a Home Service Department are just as CERTAIN and just as POSITIVE. The benefits of such a department grow by leaps and bounds.

Let me just tell you a practical example of a Home Service Department of a western city. Mrs. Anna Peterson is the Director.

Five days a week they have cooking lessons in their correctly appointed model kitchen and class room. Five times a week, 300 women come to Mrs. Peterson's classes for honest advice and instruction in cooking. Does that mean anything to the Peoples Gas Light & Coke Company?

Yes, it means 15,000 happy satisfied friends coming down town to the best friend the women of Chicago have, the gas company.

A Home Service Department should always have its model kitchen and an auditorium to seat a large group of women, depending on the size of business done by the gas company. Why? Because you are teaching proper equipment and service and the gas company is the only logical place in your community where the best service should be found.

Just another thought about a gas company here in our own state. Wishing to check up on recent range sales and satisfied users, the advertising department of this gas company compiled an attractive return post card with the following in red ink at the top of the card—

Will you please fill out this little questionnaire? We want to know if you AREN'T getting the best cooking service and we very much would like to know if you are!

Then came the following questions with "Yes" and "No" blocks opposite each question:

Does your range bake and cook satisfactorily?

Do bakings rise and brown evenly?

Is broiling convenient and successful?

Has your range an oven heat regulator?

Would you like further instruction in the use of the regulator?

Can we do anything further to help in obtaining better cooking service?

Is your range complete in every way? Are you entirely pleased with it?

Name .....

Street and No. .....

Town .....

This card helped the Home Service Department to check up its work. The returns were many and most of the "Yes" blocks were filled with crosses. There were some "Nos" which were given immediate attention.

Here is a typical answer taken from one card. This woman after filling in her card wrote across the top, "My range is wonderful. I thank Miss so-and-so for the splendid recipes she sent me. I use them all the time."

Anything performed for the benefit of Peace, Rest and Happiness equals Home Service.

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Affiliated Association Notes

Affiliated Association Meetings

The meetings of the state and district gas associations affiliated with the American Gas Association have been singularly successful this year. The attendance has been record breaking and the papers presented were of the highest order, bringing out lively discussions only possible in smaller meetings where those present are more or less intimately acquainted. It is the purpose of the Secretary-Manager to attend as many of these as is possible. Since the first of the year it has been his pleasure to be "among those present" at the meetings of the following associations:

New England Association of Gas Engineers
American Electric Railway Association
Empire State Gas and Electric Association
Public Utility Association Secretaries
Illinois Gas Association
Eastern States Gas Conference (which includes New Jersey and Pennsylvania Gas Associations)
Southern Gas Association
Southwestern Public Service Association
Indiana Gas Association
National Electric Light Association
Natural Gas Association

Assistant Secretary-Manager N. T. Sellman represented the A. G. A. at the conventions of the Iowa District Gas Association and the Wisconsin Utilities Association.

An exhibit of the literature published by the A. G. A. has been shown at the conventions of the New England Association of Gas Engineers, Illinois Gas Association, Eastern States Gas Conference, Wisconsin Utilities Association and the Indiana Gas Association. The purpose of this exhibit is to acquaint the gas men who did not have the opportunity to attend the A. G. A. convention with the service and literature which is published primarily for use in their work as gasmen.

Michigan Gas Association

This Association has compiled and published the gas rates in effect May 1, 1924, and covering every city in the State of Michigan. The list is the fourth that has been issued by the Michigan Gas Association. It is gotten out in the form of a four-page leaflet, letter size, and printed in a clear, concise manner.

Wisconsin Utilities Association

The second number of a publication being issued by this Association under the direction of Executive Secretary John N. Cadby made its appearance June 1st. It is a four page bulletin, letter size, printed very attractively on good paper. The publication of a periodical by an Association is not an easy proposition and the members of the Wisconsin Association should lend their hearty support to Mr. Cadby in this work.

New Jersey Gas Association

The Bulletin of the New Jersey Gas Association made its first appearance last month under the direction of a Bulletin Committee with Walter S. R. Dickinson as Chairman. It is to be issued in approximately quarterly numbers, issuance dates to be shifted when necessary to give timely advance information regarding Association meetings. The first issue consists of 16 pages of not only N. J. G. A. news but items of American Gas Association activities and other items of general interest to the industry. The New Jersey Gas Association has undertaken an ambitious program of which their Bulletin is but a part which is resulting in a profitable and pleasant fraternity among the gas men of that State.

Affiliated Association Notes

Pacific Coast Gas Association

By securing permanent headquarters in the Wells Fargo Building, San Francisco, the Pacific Coast Gas Association has marked another step in its growth and, simultaneously, the growth of the gas industry on the Pacific Coast. The Association has risen from a small beginning some thirty years ago until now, in its thirty-first year, its membership stands at 843 and comprises all the different phases of the gas industry, not only the public utilities and manufacturing companies but, also, the appliance men and dealers and jobbers. The increasing work of the Association in late years has brought about the inauguration of a permanent working organization, and the establishment of central headquarters is the first step in that direction.

Another new departure for the Association is the appointment of a permanent assistant-secretary who will be installed at headquarters and will give all his time and attention to the business of the Association. This post has been given to Clifford Johnstone, a gas man from the South. Mr. Johnstone knows the technical side of the gas business, is acquainted with a vast number of gas men throughout the industry, and is familiar with the various gas utilities and their problems; so the Association has chosen well in securing his services.

The next sectional meeting of this Association is to be held at the Alexandria Hotel, Los Angeles, California, on July 12, 1924. There will be a preliminary program presented in the afternoon arranged by the Meetings Committee, Chairman E. L. Hall. General arrangements for the meeting are in charge of Chairman N. R. McKee.

Canadian Gas Association

The 1924 Convention of the Canadian Gas Association will be held in Toronto, Ontario, with Headquarters at King Edward Hotel, on August 28 and 29. This will come during the first of the Canadian National Exhibition,—Canada's World's Fair, and for this reason reservations should be made early.

Southern Gas Association

The Southern Gas Association will conduct a short term Gas Meter School at the North Carolina State College at Raleigh, N. C., July 7 to 11, inclusive. The course is a well planned one and will be supervised by two expert gas meter men, Messrs. Leech and Wagner. Several prominent men of the Association will read papers and give short talks to the students. Lectures will be given on the principles of construction, action and measurement of tin and iron meters and also on procedure for testing meters. In addition there will be prover, repair bench and meter shop practice which will include the manufacture of diaphragms, diaphragm lubrication and use of complaint meters.

The Committee of this Association having this matter in charge, with B. F. Pickard as Chairman, has completed arrangements for an attractive and instructive course.

Associations Affiliated with A. G. A.

Canadian Gas Association
Date of Affiliation—Mar. 25, 1919.
Pres.—C. A. Jefferis, 265 Front St., E., Toronto, Ont., Canada.
Sec.-Tr.—G. W. Allen, 7 Astley Avenue, Toronto.
Conv., Toronto, Ont., Aug. 28, 29, 1924.

Empire State Gas and Electric Association
Date of Affiliation—Nov. 21, 1919.
Pres.—S. J. Magee, Associated Gas & Electric Cos., Ithaca, N. Y.
Chairman Gas Section—F. F. Ingwall, Binghamton Gas Works, Binghamton, N. Y.
Sec.—C. H. B. Chapin, Grand Central Terminal, New York, N. Y.
Annual Meeting, 1924.

Illinois Gas Association
Date of Affiliation—Mar. 19, 1919.
Pres.—J. G. Learned, Public Service Co. of Northern Illinois, Chicago, Ill.
Sec.-Tr.—R. V. Prather, 305 Illinois Mine Workers Bldg., Springfield, Ill.
Conv., 1925.

Indiana Gas Association
Date of Affiliation—April 24, 1919.
Pres.—G. M. Johnson, Northern Indiana Gas & Electric Co., South Bend, Ind.
Sec.-Tr.—E. J. Burke, Citizens Gas Co., Indianapolis, Ind.
Conv., 1925.

Iowa District Gas Association
Date of Affiliation—May 21, 1919.
Pres.—H. J. Carson, Cedar Rapids Gas Co., Cedar Rapids, Ia.
Sec.-Tr.—H. R. Sterrett, 551 Seventh St., Des Moines, Ia.
Conv., 1925.

Michigan Gas Association
Date of Affiliation—Sept. 18, 1919.
Pres.—Geo. H. Waring, Powers Theatre Bldg., Grand Rapids, Mich.
Sec.-Tr.—A. G. Schroeder, Grand Rapids Gas Light Co., Grand Rapids, Mich.
Conv., Detroit, Mich., Sept. 9, 10, 11, 1924.

Missouri Association of Public Utilities
Pres.—C. L. Proctor, Empire District Electric Co., Joplin, Mo.
Sec.-Tr.—F. D. Beardslee, 315 N. 12th St., St. Louis, Mo.
Conv., 1925.

New England Association of Gas Engineers
Date of Affiliation—Feb. 19, 1919.
Pres.—C. R. Prichard, Lowell Gas Light Co., Lowell, Mass.
Sec.-Tr.—J. L. Tudbury, 247 Essex St., Salem, Mass.
Conv., 1925.

Gas Sales Association of New England
Date of Affiliation—Oct. 1, 1919.
Gov.—J. J. Quinn, Citizens Gas Co., Quincy, Mass.
Sec.—J. H. Sumner, 719 Massachusetts Ave., Cambridge, Mass.
Annual Meeting, 1924.

New Jersey Gas Association
Date of Affiliation—April 25, 1919.
Pres.—Raymond W. Lee, Cumberland County Gas Co., Millville, N. J.
Sec.-Tr.—R. A. Koehler, Public Service Gas Co., Newark, N. J.
Conv., April, 1925.

Pacific Coast Gas Association
Date of Affiliation—Sept. 18, 1919.
Pres.—H. R. Basford, H. R. Basford Co., San Francisco, Cal.
Sec.-Tr.—W. M. Henderson, Los Angeles Gas & Electric Corp., Los Angeles, Calif.
Asst. Sec.—Clifford Johnstone, 619 Wells Fargo Bldg., San Francisco, Calif.
Conv., Santa Barbara, Cal., Sept. 15-19, 1924.

Pennsylvania Gas Association
Date of Affiliation—April 10, 1919.
Pres.—John A. Frick, Allentown-Bethlehem Gas Co., Allentown, Pa.
Sec.-Tr.—Geo. L. Cullen, Harrisburg Gas Co., Harrisburg, Pa.
Conv., 1925.

Southern Gas Association
Date of Affiliation—May 20, 1919.
Pres.—W. H. Taylor, Georgia Railway & Power Co., Atlanta, Ga.
Sec.-Tr.—J. P. Connolly, 141 Meeting St., Charleston, S. C.
Conv., Wilmington, N. C. 1925.

Southwestern Public Service Association
Date of Affiliation—September 26, 1923.
Pres.—G. W. Fry, West Texas Utilities Co., Abilene, Texas.
Chairman Gas Section—F. C. Armbruster, Southwestern Gas & Elec. Co., Shreveport, La.
Sec.—E. N. Willis, 403 Slaughter Bldg., Dallas, Texas.
Conv., 1925.

Wisconsin Utilities Association
Date of Affiliation—March 25, 1919.
Pres.—G. C. Neff, Wisconsin Power & Light Co., Madison, Wis.
Chairman Gas Section—I. F. Wortendyke, New Gas Light Co., Janesville, Wis.
Exec.-Sec.—J. N. Cadby, 445 Washington Bldg., Madison, Wis.
Conv., 1925.

Geographic Divisions

Eastern States Gas Conference
Date of Formation—April 11, 1923.
Pres.—P. S. Young, Public Service Gas Co., Newark, N. J.
Sec.-Tr.—R. A. Koehler, Public Service Gas Co., Newark, N. J.
Conv., 1925.

Iron Carbonyls: Their Physical and Chemical Properties*

A. C. FIELDNER, Supervising Chemist and Superintendent, and G. W. JONES, Associate Chemical Technologist, Pittsburgh Experiment Station, Bureau of Mines

ARTIFICIAL GAS, irrespective of its manufacture, contains carbon monoxide in varying proportions—from 5 to 30 per cent—and in the process of manufacture and utilization the gas is in continual or intermittent contact with iron. These two conditions suggest the question: what is the action of CO on iron at varying temperatures; and if compounds are formed by these substances, what are their importance and significance to the gas industry?

In this report the writers have collected and reviewed the literature available, so that the information may be presented in brief form for those interested. Those points which appear to be of special interest to gas men have been emphasized.

Action of Carbon Monoxide on Iron

Carbon monoxide reacts with iron at practically all temperatures—that is, from ordinary room temperature to the highest temperature obtainable in gas-works practice—the reactions and compounds formed depending largely upon the temperature.

Below 100° C., carbon monoxide combines[1] directly with freshly reduced iron to form liquid iron carbonyl ($Fe(CO)_5$).

(a) $Fe + 5CO = Fe(CO)_5$[18]

Between 100 and 300°, this compound is dissociated more or less into free iron and carbon monoxide. Towards 330°, the reaction (b)

(b) $Fe + CO = FeO + C$[1]

begins to be appreciable, and above 400° the reaction (c)

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Numbers refer to bibliography at end of paper.

(c) $FeO + CO = Fe + CO_2$[1]

produces carbon dioxide and metallic iron. The velocity of both of these reactions increases up to 450° with the reaction (b) predominating. At a dull-red heat,[2] iron continues to absorb CO and forms FeO and a little CO_2. The reactions above 400° are highly exothermic, and may heat the iron to incandescence.

At very high temperatures[3] the reaction is reversed—that is, the reaction (b) proceeds from right to left, forming CO. Finally, at yet higher temperatures, the carbide formed by reaction (e) and the metallic iron formed by reversal of reaction (b) continue to form carbides of varying composition.

When CO is passed over metallic iron heated to redness, CO_2 and carbon are produced;[4] and if the temperature is sufficiently high, the free carbon is taken up by the iron, forming Fe_3C, as in reaction (e). Some ferrous oxide (FeO), magnetic iron oxide (Fe_3O_4), and other compounds are also formed.

Reaction	Temperature range, °C
(a) $Fe + 5CO = Fe(CO)_5$[10]	Room temperature to about 250
(b) $Fe + CO = FeO + C$[1]	330 to 500
(c) $FeO + CO = Fe + CO_2$[1]	200 to 800
(d) $FeO + C = Fe + CO$[1]	Very high temperatures
(e) $3Fe + C = Fe_3C$	do.

On heating electrolytic iron to 650° in an atmosphere of CO, Carpenter[5] found a substance which he believed to be Fe_3C, formed by the reaction

$$3\ Fe + 2\ CO = Fe_3C + CO_2$$

which is facilitated by a preliminary dissociation of the CO. He states that it is possible that the stable condition at 650° is iron and graphite, the carbide formed being an intermediate unstable product. The presence of sufficient CO_2 in the CO prevented the formation of carbides, while hydrogen facilitated the reaction.

The reactions given above not only depend upon the temperature but also on the partial pressure of the gases taking part in the reactions. For comparative purposes, the reactions taken from the above data can be regarded largely as taking place within the following temperature ranges:

Iron carbonyls are formed only at temperatures below 250°, and even at temperatures above 200° they are largely dissociated into iron and CO. Since these compounds exist only at low temperatures, they can not be produced during the manufacture of artificial gas, but only when the gas has become cooled below 250°, and at these lower temperatures come in contact with iron, such as the oxide purifier boxes, distributing pipes, gas meters, and iron piping at consumers' homes.

Historical

While conducting some tests on an ammonia-soda process, Ludwig Mond noticed that some peculiar black deposits had formed on some nickel valves, and suggested the existence of compounds of CO and certain metals. Investigation of these black deposits led to the discovery of a volatile compound of nickel and CO.[6,7,8,9,10] Further investigation led to the discovery of compounds of iron and CO.[11,12,13,14,15]

In 1908, Mond and co-workers discovered a carbonyl of cobalt;[16] in 1910, a carbonyl of molybdenum,[17] and in 1921,[18] a carbonyl of ruthenium.

At the present time it appears that only the above metallic elements (Ni, Fe, CO, Mo, and Ru) are able to combine with CO at ordinary temperatures to

form carbonyls. Attempts to produce carbonyls of manganese, chromium, tungsten, palladium, and iridium were unsuccessful.[17]

Nearly all the information available regarding the physical properties of these carbonyl compounds has been published by Mond and his co-workers, and by Dewar and Jones.[18]

General Discussion of Metallic Carbonyls

Of the metals which combine with CO at ordinary temperatures, nickel and molybdenum each form only one compound ($Ni(CO)_4$ and $Mo(CO)_6$); cobalt forms two compounds ($Co(CO)_3$ and $Co(CO)_4$); and ruthenium forms two compounds, according to R. Mond,[18] although the composition of the last mentioned is not given.

Three compounds of iron have been discovered—namely, ferropentacarbonyl ($Fe(CO)_5$), diferrononacarbonyl ($Fe_2(CO)_9$) and ferrotetracarbonyl ($Fe(CO)_4$). Of these three, the first named is the most important, as the other two are produced usually by decomposition of the ferropentacarbonyl.

All of the different carbonyls have similar chemical properties. For example: when heated, all decompose into the metal and CO, the metal being deposited in the form of a bright metallic mirror. This is one of the favorite means of detecting carbonyls in a gas. They are not attacked by non-oxidizing acids, but they are quickly dissolved by oxidizing acids, especially by aqueous solutions of the halogens with the evolution of CO. At least one of the carbonyls of each metal is volatile without decomposition, and can be purified by distillation and sublimation.[17] They are all more or less soluble in the usual organic solvents, such as ether, alcohol, benzene, oils, etc.; and are all, with the exeception of one compound of ruthenium[18] insoluble in water.

The physical properties of carbonyls vary considerably, from nickel carbonyl ($Ni(CO)_4$) a highly volatile liquid of 1.32 specific gravity to the non-volatile diferrocarbonyl, with a specific gravity of 2.085. Some carbonyls can be obtained in the form of a gas, liquid, or solid; others as a solid and a gas; and still others only in the solid state. The color varies from black to white through almost the whole spectrum. Owing to the various compositions of these compounds it is extremely difficult to construct a general chemical formula for them.

Ferropentacarbonyl ($Fe(CO)_5$)

Preparation—In their first paper on the discovery of a nickel carbonyl, Mond and Quicke[6] state that numerous attempts to make CO compounds with other metals, such as cobalt, iron, copper, and platinum, were unsuccessful, although the experiments were carried out at temperatures varying from 15 to 750° C. They were later successful[12] in volatilizing a very small quantity of very finely divided iron in a current of CO. This fine metal was obtained by reducing iron oxalate in a current of hydrogen at the lowest possible temperature, about 400° C. The iron was cooled in hydrogen to 80°, and then treated with CO. The issuing gas imparted a yellow color to the flame of a Bunsen burner into which the gas was introduced. This yellow flame continued for several hours, even at ordinary temperatures. By passing the gas through a tube heated between 200 and 350°, a metallic mirror was formed, while at higher temperatures black flakes were produced. When these mirrors were dissolved, the solution gave all the known reactions for iron. Analysis of the mirrors showed that they were iron oxide in the correct proportions. The black flakes obtained at higher temperatures consisted of iron and carbon. Under the best of conditions the amount of iron

obtained in this manner was very small. Twelve grams of finely divided iron treated for six weeks had only two grams of iron volatilized. The action of CO became less after a time, and it was necessary to interrupt the process and heat the iron to 400° in a current of hydrogen for 20 minutes every 5 or 6 hours. The maximum yield from the tests was found to be not over 2 c.c. per liter of gas passed over the iron.

When the gas containing the iron was passed through sulphuric acid, the compound was completely absorbed, but the solution decomposed rapidly.

Later, Mond and Langer[12] described a slightly different method of preparing carbonyl compounds or iron. Ferrous oxalate was precipitated from a hot solution of ferrous sulphate by adding to it a slight excess of potassium oxalate, the precipitate was then washed by repeated decantations with water and dried at 120°. The dry powder was introduced into a combustion tube and heated in a gentle current of hydrogen, the temperature being gradually raised until the oxalate turned black. The finely divided iron thus obtained was allowed to cool to the ordinary temperature, and then put into water without allowing it to come in contact with the air; then boiled several times with water until all sulphate was removed; dried quickly on plates of gypsum; returned to the combustion tube, and slowly heated in a current of hydrogen to about 300° to drive off the water. After allowing the tube to cool again, the hydrogen was displaced by CO and the tube closed at one end, the other end remaining connected with the gasholder containing the CO. The CO was slowly absorbed by the iron. After 24 hours the tube was heated to about 120°, when the iron carbonyl distilled over. The yield was somewhat increased when this distillation took place in a slow current of CO, and the issuing gas passed through a coil immersed in ice solution at — 20° C. When no more carbonyl came over, the tube was cooled and connected again with the CO holder, and the process repeated. The daily production by this process rarely exceeded 1 gram from 100 grams of iron. The yield was not materially increased when exposed to CO under pressure.

Mond, Hirtz, and Cowap[16] further produced iron carbonyl by subjecting finely divided iron in an atmosphere of CO under pressure varying from 150 to 250 atmospheres, and at temperatures from 180 to 220°. Below 80° [19,20] the the reaction of CO on iron is retarded and eventually prevented, owing to absorption of the reaction products by the iron. Above 80° dissociation of the carbonyl predominates. Up to 60° the temperature has but little influence on the rate of reaction, the favorable temperature being 40 to 50°. Ammonia strongly accelerates the absorption of CO by the iron, while H_2S appears to have little influence. A small amount of CS_2 greatly retards the formation,[21] and the presence of oxygen forms a coating of oxide and gradually renders the iron inactive. In addition to this, the carbonyl itself forms a film on the iron which is not permeable to CO.

The physical and chemical properties of ferropentacarbonyl ($Fe(CO)_5$) are as follows with the authorities therefor:

Property		Authority (See Bibliography)
Occurrence	Yellow amber colored liquid	11, 12, 15
Specific gravity	1.4937 at $\frac{0}{4}$	
	1.4565 at $\frac{21.1}{4}$	15

	1.4330 at $\frac{40}{4}$	
Molecular weight	198	15
Boiling point	102.0° C. at 744 mm. Hg.	15
Melting point	19.5 to—20.° C. forming pale yellow solid. At temperature of liquid air entirely loses its color	15
Critical temperature	285 to 288°	15
Critical pressure	29.6 atmospheres (calculated)	15
Critical density	0.49	15
Latent heat of evaporation	39.45 calories per gram	15
Refractives indices:		
For Na light	1.519 at 22°	
For Tl light	1.528 at 22°	15
Vapor pressure	Temperature °C / mm. Hg. Pressure: 7.0 / 14.0; 0.0 / 16.0; 16.1 / 25.9; 18.4 / 28.2; 35.0 / 52.0; 57.0 / 133.0; 78.0 / 311.2	15
Vapor density	6.4 to 6.5	12
Soluble in	Alcohol, ether, benzene	12
	Solution deposits dark-colored crystals when exposed to light.	
	Mineral oil (boiling point 250 to 300° C.)	11
	Impossible to separate carbonyl from the oil. When heated to 180° solution turns black, metallic iron separates, and CO is evolved.	
Reactions:		
Hydrochloric acid	No reaction even after 3 weeks in the dark.	15
Hydrobromic acid	No action even after 3 weeks in the dark.	15
Nitric acid	Reacts readily.	12
Sulphuric acid	Absorbed completely. Solution decomposes rapidly.	11
Alkalies	Disssolves carbonyl with evolution of gas, and in time a greenish precipitate of hydrated ferrous oxide is formed.	14
Chlorine	Complete decomposition, with evolution of CO and solid $FeCl_3$ and $FeCl_2$.	
Bromine	Reacts very slowly, with evolution of CO and $BeFr_2$, and trace of $FeBr_2$.	15
Iodine	Reacts extremely slow, with evolution of CO and FeI_2.	15
Iodine mono-chloride in chloroform	Reacts giving $FeCl_3$—I_2, and the solution becomes purple.	15
Iodine trichloride in chloroform	Reacts slowly, producing a solid deposit ($FeCl_3$) and evolving CO.	15
Cyanogen	No reaction.	15
Cyanogen in alcohol	Extremely slow reaction.	15
Cyanogen iodide in Chloroform	Reaction very gradual, first becoming red, then purple, and a brown solid deposited ($Fe(CN)_2$ with a little FeI_2).	15
Sulphur in carbon bisulphide or xylene	No action in the cold.	15
Hydrogen sulphide	No action in the cold.	15
Hydrogen sulphide in alcohol	Extremely slow reaction, forming $FeS + CO$ and H_2.	15
Nitric acid in ether or carbon tetrachloride	Reacts rapidly, producing a mixture of $Fe(NO)_2$, $Fe(NO)_3$, CO and H_2, and some reduction products.	15
Carbon bisulphide	No reaction in dark. In light reacts to form solid precipitate.	15
Reactions:		
Nitrobenzene	No reaction in dark. In light reacts to form solid precipitate.	15

Alcoholic solution of mercuric chloride	Slight evolution of CO and yellowish crystalline precipitate formed containing Fe, Hg, Cl, and CO.	12
Burning in a Bunsen flame	Imparts yellow color to flame.	11
Exposure to Air	Liquid becomes brown due to absorption of oxygen and hydrated ferric oxide is precipitated.	12
Exposure to moist air	Reddish precipitate formed on standing.	15
Effect of heat:		
Heating vapor to 180° C.	Completely decomposed, forming Fe and FeO, and CO evolved.	12
Effect of light:		
Liquid in the dark	Undergoes no change.	12
Liquid in the light	Reacts to give $Fe_2(CO)_9$ and CO.	15
Sunlight	Rapidly decomposed with evolution of CO, and production of $Fe_2(CO)_9$.	15
Electric arc	Slowly decomposed to give above reaction.	15
Acetylene	Extremely slow decompositon to give above reaction.	15
Liquid in benzene containing trace of thiophene	When exposed to light a black solid is deposited.	15
Explosive properties	According to Mond[14] a mixture of nickel carbonyl in air readily explodes, but not violently. No data is available regarding the explosive properties of iron carbonyl.	14
Toxic properties	No information was found regarding the toxicity of iron carbonyl; however, the similar compound of nickel was found by Mond[14] to be poisonous, and when injected (amount not stated) subcutaneously there was a reduction of temperature sometimes as much as 12° F.	14

Diferrononacarbonyl ($Fe(CO)_9$)

Preparation. This compound was first obtained by Mond and Langer[12] by the action of light on ferropentacarbonyl ($Fe(CO)_5$), and although they gave the formula as $Fe_2(CO)_7$, the product which they made was evidently a mixture, as was proved later by Dewar and Jones.[15] These later investigators established its identity as diferrononacarbonyl ($Fe_2(CO)_9$).

Mond and Langer[12] prepared this carbonyl by exposing ferropentacarbonyl to light for several hours. The carbonyl appeared as gold-colored tabular crystals, and when dried resembled gold flakes having a metallic luster. Dewar and Jones[15] prepared it in similar manner, but their product consisted of beautiful, lustrous hexagonal plates of an orange color, which, when pure, retained their color for a long time on exposure to moist air, and indefinitely in dry air. Tests made by these investigators showed that of the solar spectrum, the blue was about ten times as effective as the red for producing the reaction.

The physical and chemical properties of diferrononacarbonyl are as follows:

Property		Authority (See Bibliography)
Occurrence	Solid, beautiful, lustrous hexagonal plates of an orange or golden color.	15
Density	2.085 at 18° C.	15
Soluble in	Ether, toluene, and alcoholic caustic potash.	12, 15
	Bromine water, with evolution of CO	12
Reactions:		
Chlorine water	Decomposition with evolution of CO	12
Nitric acid	Do.	12
Sulphuric acid	No action at ordinary temperatures	12
Hydrochloric acid	No action at ordinary temperatures	12
Solubility:		
Petroleum ether	Insoluble.	15

Methyl alcohol	Slightly.	15
Pyridine	Dissolves to form reddish solution.	15
Effect of heat	Heated to 100° liquid $Fe(CO)_5$ formed, CO evolved, and solid precipitated (iron).	15
Heat and pressure	With pressure of CO equal to 150 atmosphere and 95°, the solid changes to liquid Fe $(CO)_5$, Fe, and CO.	15
Solid dissolved in ether or toluene and heated	Change takes place at 50 to 90° in atmosphere of CO_2, and liquid acquires an intense green color forming Fe $(CO)_4$, iron tetracarbonyl.	15

Iron tetracarbonyl ($Fe(CO)_4$)

Formation. Iron tetracarbonyl was first obtained by Dewar and Jones[22] while studying the decomposition of diferrononacarbonyl in solvents. This carbonyl is only of academic interest, because it is formed only as a decomposition product of the more stable diferrononacarbonyl by the action of heat.

When Dewar and Jones[22] heated crystals of Fe_2 $(CO)_9$ in toluene at 50 to 90° in an atmosphere of CO_2, intensely green solutions were obtained, which, on exposure to light, gradually lost their color. From the green toluene solution iron tetracarbonyl was obtained. It is considered that when F_2 $(CO)_9$ is heated above 100°, or in the presence of solvents at lower temperatures, it decomposes to give the tetracarbonyl as in reaction (4).

$$Fe(CO)_9 = Fe(CO)_4 + Fe(CO)_5$$

The tetracarbonyl thus formed was found to be very stable under ordinary conditions.

The physical and chemical properties of iron tetracarbonyl are as follows:

Property		Authority (See Bibliography)
Occurrence	Dark-green lustrous prismatic crystals.	22
Specific gravity	1.996 at 18°	22
Soluble in	Toluene, light petroleum ether, and many other organic solvents.	22
When heated	Heated to 140° gives Fe and CO.	22
Solutions	Lose their intense green color slowly at 100° but rapidly at 140°, iron being deposited and Co evolved.	22
Tetracarbonyl in pyridine or alchohol	Green at first, then turns red on standing.	22

Presence and Occurrence of Iron Carbonyls in Gas-Works Practice

Iron carbonyl has been found[14] in CO which had been compressed in an iron cylinder, and is believed to be the cause of the red deposit sometimes found upon gas burners. It has been found in compressed gas used for limelights, and it has been suggested that it exists in blast-furnaces working too cold, and also to be the origin of large deposits of Fe_2O_3 sometimes found in the downpipes leading from the furnace.

During some experiments[23] being made in the application of water gas for illuminating purposes it was occasionally observed that after the water gas had impinged on the "comb" for several hours that a deposition of Fe_2O_3 was formed on the magnesia rods, the result being that the illuminating power was considerably lowered. At first it was thought that the iron came from the particles of dust that were present in the atmosphere of the steel works where the experiments were being conducted, but further examination of the burners showed that iron compounds were in the gas itself. To determine whether the iron was in the gaseous state or as finely divided particles, the gas was filtered through several tight plugs of cotton to filter out solid

particles of iron. After 4 or 5 hours the deposit was still observed showing the iron to be in the gaseous state. The quantity, however, was extremely small; yet the authors[23] conclude it might be most serious to the technical application of water gas as an illuminant.

Other tests were made in which water gas was compressed into steel cylinders to a pressure of 8 atmospheres, and on burning the gas immediately after compression, no visible alteration in the color of the flame or amount of iron contained in the gas was observable; but after the compressed gas had remained in the cylinders for about a month it was found, that when it was burned, the flame was highly luminous and instantly deposited a yellowish-red coating of Fe_2O_3, proving that a much larger quantity of iron was contained in the gas which had been left than in the original compressed gas. On passing a small quantity of the gas through a heated piece of combustion tubing, a large black mirror of metal was deposited on a porcelain plate held above it. When a plug of cotton wool was inserted between the heated portion of the tube and the burner, the flame instantly became non-luminous; and in a few seconds the cotton wool nearest to the heated part of the tube became black, and in a short time the whole plug was deeply stained with finely divided metal. Hence it was evident that under a pressure of 8 atmospheres the CO contained in water gas (about 39 per cent in this case) slowly attacked metallic iron at the ordinary temperature. Some tests were made in which 30 liters of the gas was in contact with the iron for a half hour gave 2.4 milligrams of iron per liter.

Guntz[24] noticed a deposit of Fe_2O_3 on the cover glasses and porcelain reflectors of certain gas lamps which had been burning for some time and believed it to be due to the presence of iron carbonyl in the gas which was probably formed by interaction of CO contained in the gas and the metallic iron which is used as a desulphurizing agent.

Van Breukeleveen and Horst[25,26] state that iron carbonyl in water gas causes the deposition of Fe_2O_3 on incandescent gas mantles, the illuminating power thereby being rapidly diminished. Water gas takes up iron when left in contact with it at ordinary temperatures and pressures and is not formed in the water-gas generating plant. A sample of gas containing 37 per cent CO, after remaining for one week in contact with a polished iron surface, yielded a large amount of volatile iron compound. When the amount of CO was low the action was inappreciable; a sample of coal gas containing only a small amount of CO remained quite free from iron carbonyl after one week's exposure to iron surfaces. The authors[25,26] state that gas may be freed of iron carbonyl by passing it over copper heated to 300° C., or over moistened potassium permanganate.

Jeune[27] found that incandescent gas mantles used with coal gas produced from a certain Dutch works rapidly lost their illuminating power, and became covered with a yellowish-brown deposit. The authors found this to be due to iron carbonyl ($Fe(CO)_5$) present in the gas. This gas contained only 7 per cent of CO, and it appears that the carbonyl was produced by the action of CO on the iron of the mains at low temperatures. Tests made at the gas works in question showed that several weeks after the first tests had been made, less carbonyl was present, probably owing to the surface of the mains having been coated with tar and naphthalene.

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WANTED—Position of responsibility as Manager or Industrial Fuel Engineer—18 years' varied experience in the gas business. References and service record furnished. Address A. G. A.
Key No. 142.

WANTED—Am open for position as general superintendent, engineer or manager of fair sized property. Fifteen years' experience in combination coal and water gas plants. Experience covers vertical and horizontal coal gas installations, also distribution work. At present am managing plant of five million sendout and have been acting in capacity of assistant engineer. Can furnish excellent credentials from present and past employers. Married. Can report with reasonable notice. Address A. G. A. Monthly.
Key No. 164.

ENG.-SUPT. of one of the largest gas plants in the country would consider change. Desires to locate with company in which opportunities for future advancement are better than in present position. Is a married man. Has technical University training. No particular preference as to location. Address A. G. A.
Key No. 159.

AVAILABLE—Man of executive ability, experienced in all phases of the gas business and sales and advertising work, including agency work on National accounts. Capable of creating, planning and following through all forms of advertising. Prefer locating in West or South Atlantic states. Minimum salary of $4,000. Address A. G. A.
Key No. 167.

WANTED—Superintendent of Distribution seeks similar position high or low pressure. 14 years' experience covering all branches of the work, office, field, and shops. Speaks and writes Spanish. Southern part of U. S. or Latin America preferred but not essential. Address A. G. A.
Key No. 169.

AM OPEN FOR A POSITION of greater responsibility. At present, manager of gas company with over 5,000 meters. Technical training started in as cadet engineer with one of largest operating companies in U. S. Have eleven years' experience in engineering, construction, distribution and manufacturing, and over four years in commercial, new business and financial as manager. Prefer manager's position in good sized city. Age 40 years and married. Address A. G. A.
Key No. 170.

GAS ENGINEER—Eighteen years' experience in design, construction and operation of gas plants, all departments, manufacture and distribution, also electrical experience in combination plants desires position of responsibility with progressive company. Past six years chief engineer with large gas company. Address A. G. A.
Key No. 171.

EXECUTIVE, with fifteen years' experience in coke oven practice on plants manufacturing surplus gas for city consumption, desires connection with growing public utility either as executive or position leading to same. College graduate, good personality, married. Available on reasonable notice. Address A. G. A.
Key No. 172.

GAS ENGINEER—18 years' experience with 3 largest gas companies in the country, am open for engagement as gas engineer, general superintendent, manager or sales engineer. Excellent references. Address A. G. A.
Key No. 173.

ENGINEER—Twenty-one years' experience in Gas and Electric production and distribution, wishes an opening with a larger gas company or a combination gas and electric company. Eleven years with the United Gas Improvement Co. Highest reference from present connection. Address A. G. A.
Key No. 174.

WANTED—A position as General Manager or Engineer of Gas Property. Have had experience and can produce results in either large or small properties. Can give exceptional references on past record. Address A. G. A.
Key No. 175.

GAS ENGINEER, 40, with thorough training (17 years) in the gas business and real executive ability, wishes to connect up with a live concern in any capacity where technical and commercial ability will count. At present engaged, but could be available on two months' notice. Address A. G. A.
Key No. 176.

WANTED—Executive position by young man with eighteen years' (18) experience in all branches of gas business. Eight years (8) as manager. Past four years, vice-president and general manager of gas company with nearly 10,000 meters. Mechanical engineer. Expect to voluntarily place myself on the market about August 15, 1924. Will accept position as manager of company with 7,000 to 10,000 meters, or assistant manager and engineer, with larger company. Married man. Replies must be strictly confidential. Address A. G. A.
Key No. 177.

WANTED—Position as superintendent of small gas company or combination gas and electric company, or as assistant to superintendent or manager of a large plant. Technical university training. Five years' experience in maintenance and operation of steam, gas and electric plants. Address: A. G. A.
Key No. 178.

WANTED—Am open for position as appliance salesman with Gas Company or Appliance Manufacturer. Have had twelve years' experience selling ranges, water heaters, room heaters and illuminating devices. Am at present employed in this capacity by a large corporation, but desire to make a change. Can furnish references from present and past employers. Married. Can report on reasonable notice. Address A. G. A.
Key No. 179.

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